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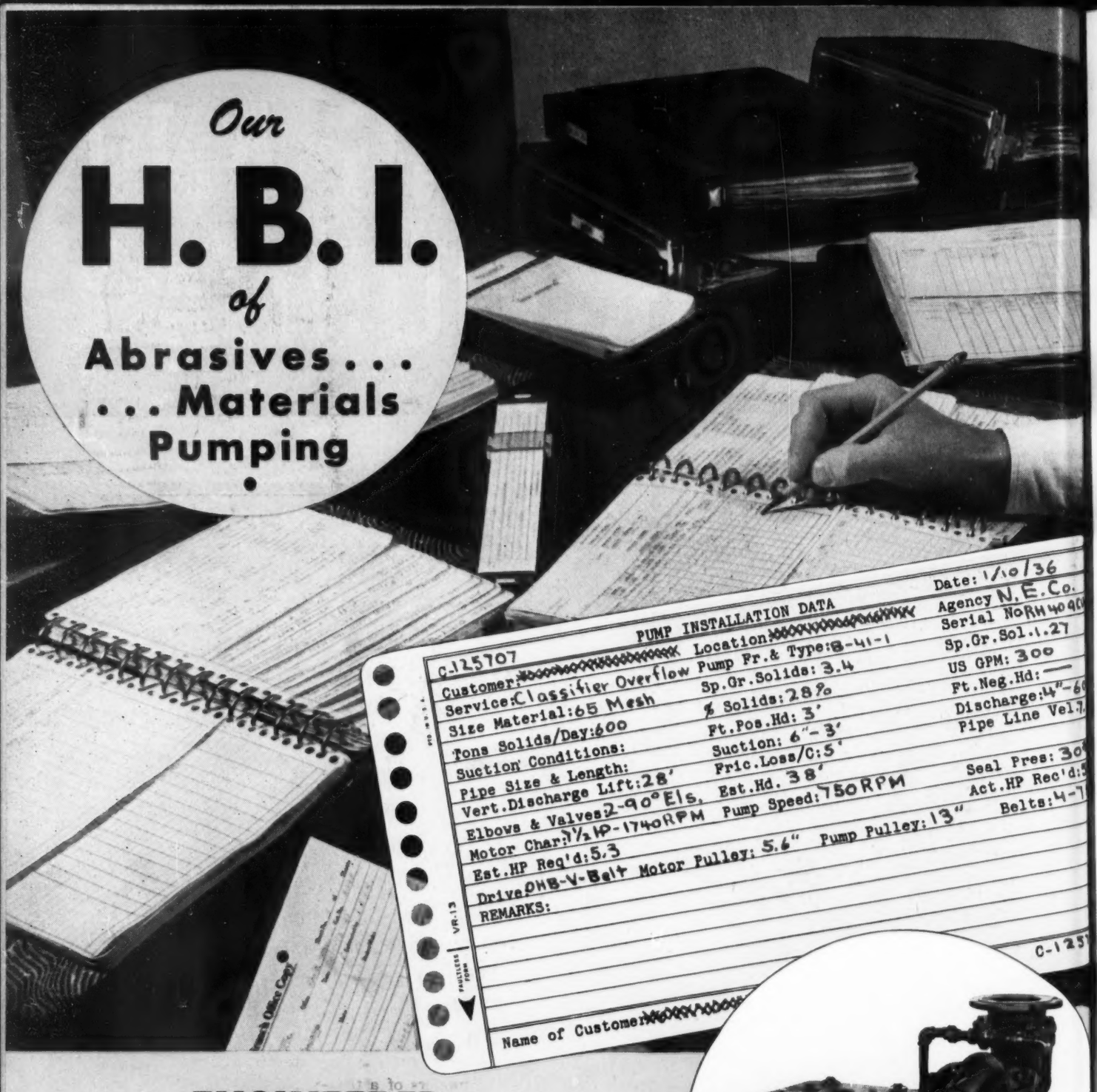
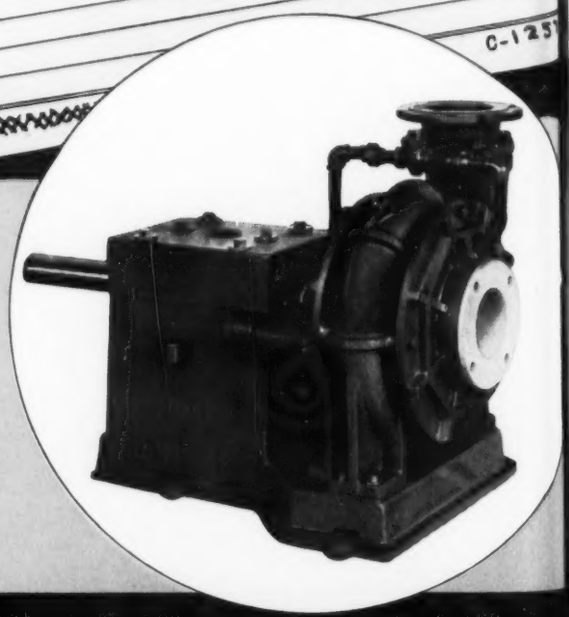
Train crew loading cars at a chute on the main haulage level

The Airborne Magnetometer for Reconnaissance Page 70





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ENGINEERING AND MINING JOURNAL

ALFRED M. STAEHLE, Publisher — EVAN JUST, Editor

H. C. PARMELEE, Editor Emeritus; A. H. HUBBELL, Managing Editor; ROBERT H. RAMSEY, ALVIN W. KNOERR, Associate Editors; H. H. WANDERS, Market Editor; THOMAS L. WELLS, W. N. P. REED, Assistant Editors. San Francisco: J. B. HUTTL, Associate Editor; G. J. YOUNG, Consultant. H. R. MATHIAS, Sales Manager

Volume 147 **Number 6**

A McGRAW-HILL PUBLICATION

McGRAW-HILL PUBLISHING COMPANY, INC.

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Company Offices

Publication Office: 520 N. Michigan Ave., Chicago, Ill. Editorial and Executive Offices: 330 West 42nd Street, New York 18, N. Y. Cable Address: McGraw-Hill, New York. Branch Offices: San Francisco 4, 68 Post St.; Chicago, 520 N. Michigan Ave.; Los Angeles 14, Calif., Pacific Finance Building, 621 S. Hope St.; Washington, D. C., National Press Building; Pittsburgh, Pa., 738-9 Oliver Building. District Managers: New York, T. E. Alcorn, F. W. Roets; Philadelphia, W. A. Potter; Cleveland, W. M. Spears; Pittsburgh, W. S. Drake; Chicago, S. J. Alling; St. Louis, C. J. Coash; San Francisco, J. W. Otterson. London Address: McGraw-Hill Publishing Company, Ltd., Aldwych House, Aldwych, London, W. C. 2, England. Cable address: Blacklash, Estrand, London.

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Subscription Information

ENGINEERING AND MINING JOURNAL, June, 1946, Vol. 147, No. 6. Published monthly at 520 N. Michigan Ave., Chicago, Ill. Return postage guaranteed. Subscription rates: United States and possessions $3 a year, $4 for 2 years, $5 for 3 years. Canada $4 a year, $6 for 2 years, $8 for 3 years. Pan American countries $5 a year, $8 for 2 years, $10 for 3 years. Elsewhere $8 a year, $12 for 2 years, $16 for 3 years. Please indicate position and company connection in all subscription orders. Price of this issue, 50 cents. Entered as Second Class Matter, May 19, 1945, at the Post Office at Chicago, Ill., under the act of March 3, 1879.

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Front cover illustration by courtesy of Jeffrey Manufacturing Co.

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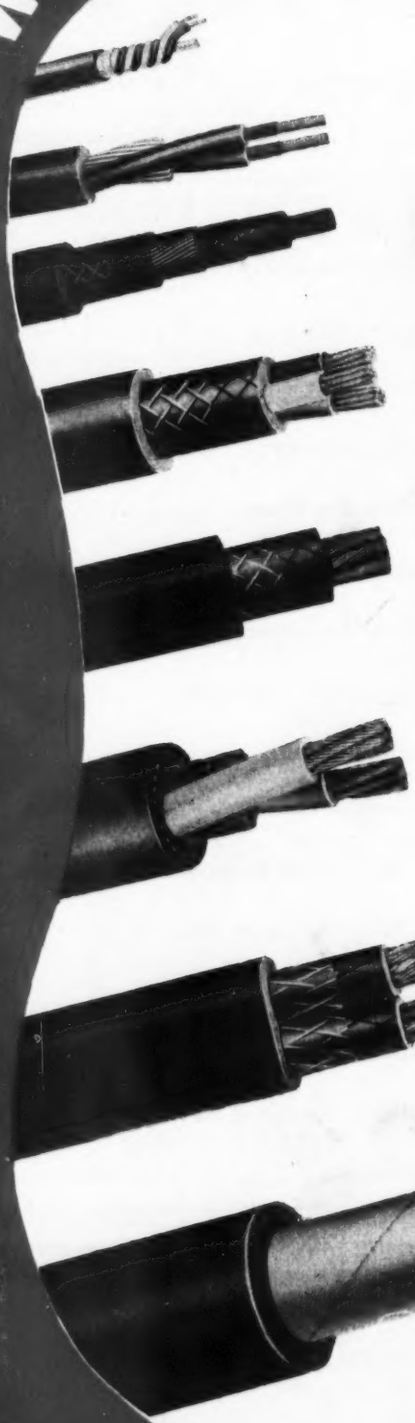

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ENGINEERING AND MINING JOURNAL

JUNE, 1946

The End Is Not in Sight

THOUGH the rail and soft-coal strikes are ended, and with them the immediate national emergencies which they created, and though Congress is said to be engaged in drafting legislation to prevent any group of workers from ever again striking against the Government, the nation has small cause for complacency over the recent turn of events. That rail men and miners should be willing to precipitate a major internal crisis simply to "get theirs" and make already good wages better, gives food for thought as to the stability of this democracy. Even more alarming has it been to witness the reluctance with which the high executive and certain legislators moved to find a cure for the situation. This alarm was only increased when John L. Lewis, so widely condemned for his course, emerged as winner of the coal dispute and by Government award.

It would be futile and presumptuous for us to comment at long range on the details of the coal, rail, and metal mining disputes. Many of the claims on both sides are undoubtedly reasonable from the viewpoints of the several participants. Nevertheless, this much can be said: Public policies which permit *any* minority to disrupt the nation's economy and leave the Government with no dependable recourse as a last resort are bankrupt. The enactment of new legislation to provide new curbs is therefore vital.

If the present cycle of wage-price increases precipitates a new set of demands based on higher living costs, we are able to see no end of turbulence and inflation.

To list the inevitable results, prices will be higher, the unorganized public will pay an immense bill, reconversion will be delayed for several months, and we shall have more of the inflation which Government pretends to abhor but continues to encourage.

Without better leadership, it is obvious that the expensive spiral merry-go-round will continue until enough citizens get mad and stay mad long enough to outweigh the votes of the pressure groups who now control our politicians. Too many of the latter, having no convictions of their own for which they will stand fire, incline to the viewpoint that the memory of the public is short, but that the memories of the organized minorities are long. While a major dispute is in progress, the politicians are under great pressure from an angry public. If the pressure lasts long enough, the politicians will act. However, they will act reluctantly because experience indicates that the public is all too likely to forget the whole business as soon as the dispute is over. On the other hand, next November and in 1948 the organized groups who have been enjoying special privileges will assuredly be ringing doorbells at election time.

Possibly, if we could be philosophical, we would perceive that these are simply details and that a democracy, weakly led, cannot avoid inflation when overshadowed by a per-capita debt that exceeds the average yearly income. Nevertheless, inflation will exact a price from all people who have savings or are not organized into pressure groups, and a particularly painful one from those who must depend on limited savings for their declining years. Moreover, when we temporize with inflation, we risk a full-scale panic—a real "trip to the cleaners"—which reasonably firm leadership could avoid.

The Orange Free State Bonanza

"ABOUT FIVE MILES southeast of Odendaalsrust, Geduld Hole No. I . . . has intersected the Basal Reef at a depth of 3,922 ft. with a true width of 18.4 in. assaying 1,252 dwt. per ton. . . . In view of the special importance of this Basal Reef intersection, the boards of the two interested companies have decided to publish this result immediately."—*Press release on April* 16, 1946, *by Anglo-American Corporation on behalf of Western Holdings, Ltd., and Blinkpoort Syndicate.*

"London stockbrokers were beaten by the clock yesterday in a scramble for shares of Western

Holdings, Ltd. . . . Frantic dealings were already well in progress in South African markets when the London Stock Exchange opened to a melee of eager and excited brokers. Within half an hour some £2,000,000 had been put on the market valuation of Western Holdings' £590,000 worth of 5s. shares."—*London News-Chronicle, April* 17, 1946.

"The remarkable gold strike last week in the Geduld borehole near Odendaalsrust has proved finally and beyond all doubt the existance in the Orange Free State of a payable gold field."—*Sir Ernest Oppenheimer, chairman of Anglo-American to the "Rand Daily Mail," April* 22, 1946.

". . . again excited dealings in Free States and the enormous turnover continued. New buyers, however, found more sellers than on previous days, and prices fluctuated widely."—*London Financial Times, April* 25, 1946.

". . . at 3922 ft. in depth, the drill passed through the Basal Reef with a true width of 6.8 in. assaying 3,377.5 dwt. per ton. . . . Immediately below the Reef, the quartzite is mineralized for a true width of 11.6 in. assaying 6 dwt. per ton. Combining the results from the Reef and the underlying quartzites gives a true width of 18.4 in. assaying 1,252 dwt. per ton."—*R. B. Hagart, chairman, Western Holdings, Ltd., at Johannesburg meeting April 18, 1946, as reported in London Financial Times, April 26, 1946.*

"We are naturally not justified in attaching too much importance to any one borehole result, and in this case (the Geduld No. I.) the astounding value encountered must be looked upon as in the nature of a freak."—*Sir Ernest Oppenheimer, to Anglo-American Corporation shareholders in Johannesburg, on May 1, 1946.*

The foregoing is the story, thus far, of the Orange Free State "gold strike," as it came to us through the press. We will not attempt to editorialize on any aspect of the affair, except that we cannot resist commenting that the word "assay" doesn't seem to mean the same thing in the Transvaal that it does to us. This "combining" of 6.8 in. at 3,377.5 dwt. and 11.6 in. at 6 dwt. to get 18.4 in. "assaying" 1,252 dwt. reminds us of the hamburger stand proprietor who, during the meat shortage, made hamburgers out of horse meat and rabbit, mixed. "I mix it strictly 50-50," he said, "one horse to one rabbit." In this case, the horse seems to be on the "eager and excited brokers" and their clients, who made the stock exchanges pay briefly at a rate no gold field could match.

June Was Once the Month of Assessment Work

WERE IT NOT for the continued suspension of the provision of the mining law that requires a Federal claim owner to do $100 worth of work on his claim before noon on July 1 annually, the current month would be marked just now by great activity on the part of those owners who hitherto had neglected this task. Such last-minute activity, as well as the performance of assessment work in general, have become exceedingly rare in recent years because of the continued suspension of the law. Specifically, the requirement has been suspended for every year since 1931 with the exception of the period from Sept. 1, 1939, to July 1, 1941. During the thirties, hard times provided the reason, although labor was plentiful; latterly the scarcity of labor arising out of war conditions and the absence of claim owners in the Armed Services have been regarded as justification.

Prior to 1932 the legal requirement had been suspended only in exceptional cases, at first in 1893 and 1894, when times were hard, and next in 1913, when suspension of a limited sort was authorized, benefiting only those holding claims on the Seward Peninsula, Alaska. Congress again took action in the first World War and permitted suspension for the years 1917 to 1919. In the years that followed no further suspension was granted until 1932 (although there was a six-months' extension of time in 1920, and in 1921 the assessment work period was changed from the calendar to the fiscal year).

As matters stand at present, under the Act of May 3, 1943, claim owners have until July 1, 1948, to do their work unless the President proclaims the official end of hostilities before July 1, this year, in which case they have until July 1, 1947.

Thus it appears that what originally was a rare occurrence, intended to help claim owners in an emergency, has been a "hardy perennial" for 14 years (if we except the 22 months beginning Sept. 1, 1939) and in all likelihood is good for another two years. The war years were indeed a period of emergency and the shortage of labor in certain areas is an adequate excuse to suspend requirements until 1947, but we see no basis for prolonging the suspension until July 1, 1948.

The prime purpose of the United States mining law in allowing a prospector to hold a claim indefinitely, provided he does $100 worth of work on it annually, was and still is to encourage development of the nation's mineral resources. How rapidly such development is proceeding, or whether it is being done in all cases, is therefore a matter of importance, in view of the depletion of reserves.

If anyone fondly thinks, however, that this information is a matter of Government record, he is most mistaken. Only in the office of the recorder

in the county where the claim is located is there any record of the location and the locator, as well as of the owner's affidavit that he has done the annual work. The recorder, moreover, does not verify the owner's affidavit. No agency or individual is authorized to bring this scattered information together regarding the myriad claims in many counties in many states, so as to give an over-all picture. The Land Office, at Washington, does not interest itself unless a claim holder wishes to patent his claim. Then only is a check made to see if the assessment work has actually been done.

Although we are unsympathetic to use of the Land Office as an instrument for effectuating the Raushenbush doctrine of "encroaching controls" over the mining industry, it certainly must be admitted that the present system is far from satisfactory. In addition to the faults cited, there is no machinery in the county recorder's office or elsewhere for checking to see if locations are properly made, for accurate surveys of claim boundaries, or for spotting claims on any official maps. As a result, titles are subject to all kinds of disputes, and the laxity of the system lends itself to taking up mineral claims for fraudulent purposes, such as timber cutting and grazing.

Next year will mark the 75th anniversary of the enactment of the present United States mining code. What better way to celebrate it could there be than to initiate an investigation of the situation that has come about through the original and unmodified laxity of the law. Some means must be devised for detecting the fraudulent cases, of which there must be many. The basic question in any case is whether an honest effort to find a worthwhile ore deposit is being made.

Thoroughgoing Research Indicated for Gold Mining

AS WE STATED editorially last month, we see no probability in the next few years of a higher United States gold price. This may come, if continued temporizing with inflation causes an important sag of public confidence in our managed currency. It may come if the International Monetary Fund and Bank (Bretton Woods program) fail, and leading nations turn again to currency devaluation for financial face-lifting. Also, the gold miner's economic status may improve if the country plunges into another depression. However, none of these external benefits to domestic gold mining is in the cards for the next several months, if at all. For the time being the gold miner must depend on his own resources, inasmuch as legislation intended to compensate him for the Government's unique, arbitrary, wartime shutdown edict is dead for this session of Congress.

In brief, the gold miner who has not been able to resume operations since L-208 was lifted, or who is operating "in the red" or barely breaking even, must make the most painstaking search for ways and means of improving his profit margin by cutting operating costs. This may be by changing the scale of operations, or the method of mining or treatment. It may be by getting more efficient labor or improving the efficiency of labor by better management. It may be by improving the productivity of labor through more extensive mechanization. It may be by resorting to incentive contract and leasing systems. Possibly more modern drills, improved drilling and blasting practice, mechanical shoveling, scrapers, conveyors, modernized haulage or hoisting, better dirt-moving equipment, automatic grinding and classifying controls, better milling and treatment equipment, all should be considered, one by one. Such items as living conditions, grievance procedures, safety practices, silicosis prevention and ventilation, all deserve study in the search for improvement. Possibly much power and air equipment in use is not efficient today.

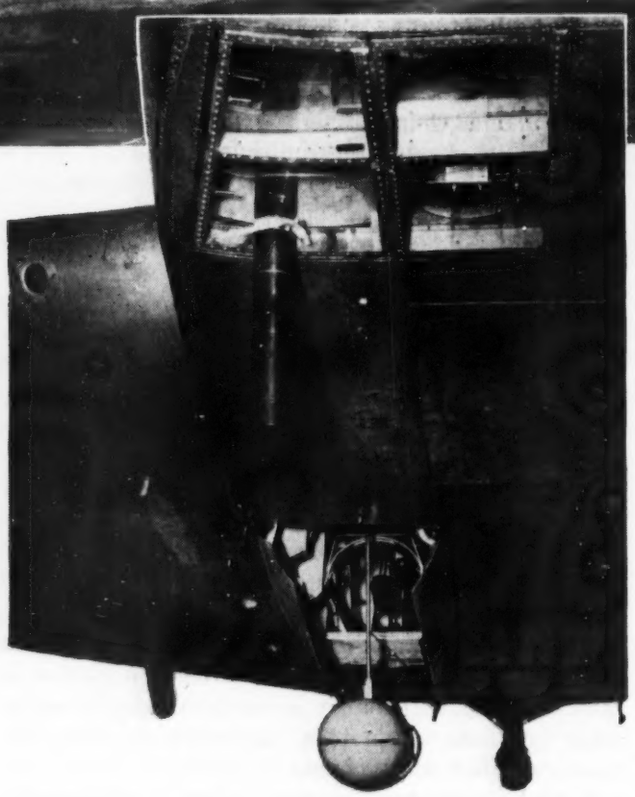
Gold mining had some good years during the thirties. Then, when the war came on and the operators lost men to other industries, conditions were not conducive to investments aimed at cutting operating costs. Under these circumstances, it would be remarkable if some opportunities to improve efficiency were not passed up.

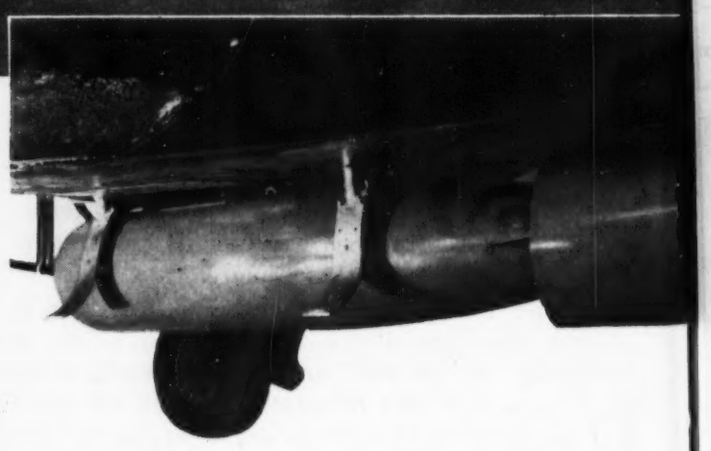
Possibly intelligent self-interest would dictate that some gold-mining operations with similar problems could conduct a group investigation to advantage, hiring outside talent to criticize their practices, or canvassing the methods employed in other districts having comparable problems, both by a search of technical literature and by visiting other gold and base-metal operations. The traditional generosity of mining men in letting other operators observe their improvements in practice should facilitate such an investigation. It may even be worth while—and this possibility is not confined to gold mining—to call in some good engineers who specialize in management efficiency in general, but who are not mining men. A fresh viewpoint is always likely to produce some benefits. Probably mine problems are not as "different" in many respects as most mine operators think.

Gold miners have always been a resourceful breed. We predict that, looking back five years from now, many will have whipped problems that looked insuperable today.

The Airborne Magnetometer...

A wartime development remains in peacetime to accelerate geophysical reconnaissance surveying of regional scope





A TWIN-ENGINE BEECHCRAFT AIRPLANE (top of page) tows the bomb-like "bird" which contains a sensitive magnetometer in its head. The magnetometer measures the total intensity of the earth's magnetic field, and these values are recorded continuously on an instrument tape in the cabin of the airplane. Magnetometer readings are keyed to the ground position of the plane at any instant by means of a continuous-strip camera which takes an uninterrupted photograph of the terrain over which the airplane passes during the survey.

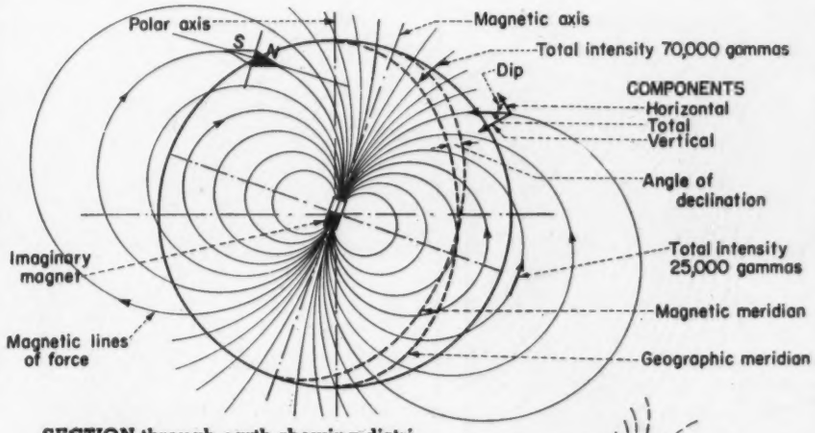
LENS SHIELD of the gyroscopically stabilized 35-mm. continuous-strip camera is shown projecting through an opening in the floor of the plane. The "bird" is reeled into the cradle shown inside of the airplane cabin.

FORMERLY THE "BIRD" WAS SUSPENDED IN A CRADLE beneath the airplane as shown at the lower right. More recently a plane with bomb-bay doors has been used, which enables the operator to reel the "bird" into the cabin as shown at the left.

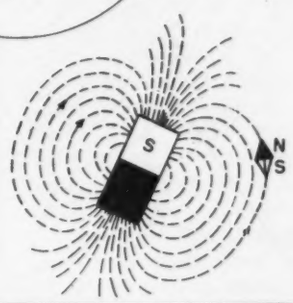
A New Aid to Geophysics

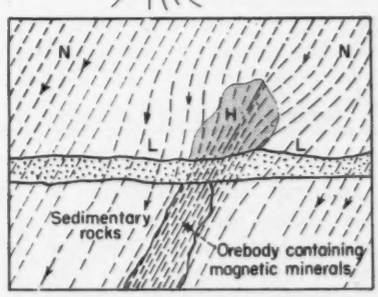
ALVIN W. KNOERR,
Associate Editor

REGIONAL SURVEYS conducted with the airborne magnetometer by the U. S. Geological Survey over more than 40,000 square miles of land have demonstrated that this device is practical for geophysical exploration. The value of the equipment for such purposes was established by successful test surveys over metamorphic rocks



SECTION through earth showing distribution of magnetic lines of force. (Meridians are sketched as if on surface.) A freely suspended magnetic needle indicates the direction of these lines at any point. Compare this with field around short magnet, at right.





THIS HYPOTHETICAL OREBODY containing strongly magnetic minerals is shown to emphasize the distortion that would be produced in the earth's normal magnetic field because of the greater permeability of the orebody. If a magnetometer were placed in various positions on the surface and in the air, high readings would be obtained at H, low ones at L, and normal ones at N. One advantage of the airborne magnetometer over ground operated instruments is its ability to measure magnetic fields at various altitudes.

WHAT IS A GAMMA?

A brief description of the earth's magnetic field is presented here for readers who may not be completely familiar with some of the terms and scientific principles mentioned in the accompanying article.

For convenience, the earth's magnetic field is described as one which would exist if a short but extremely powerful magnet were situated near the earth's center. In many ways this field is identical to that which exists about a short bar magnet and which exhibits its characteristics when iron filings are sprinkled about the magnet.

Magnetic fields are represented conventionally by a pattern of closed lines traveling from the north pole of the magnet, or magnetic field, to the south. When surveying or investigating these fields, it is necessary to determine the direction of the field (or lines) and intensity at any point. As a freely suspended magnetic needle or compass will orient itself parallel to these imaginary magnetic lines of force, with the north pole of the needle pointing away from the north pole of the field, this principle is often used to determine field direction. Field intensity is measured with some type of magnetometer, which may be a simple, properly oriented dip needle, or more sensitive designs such as the field balance, earth inductor, or electronic types.

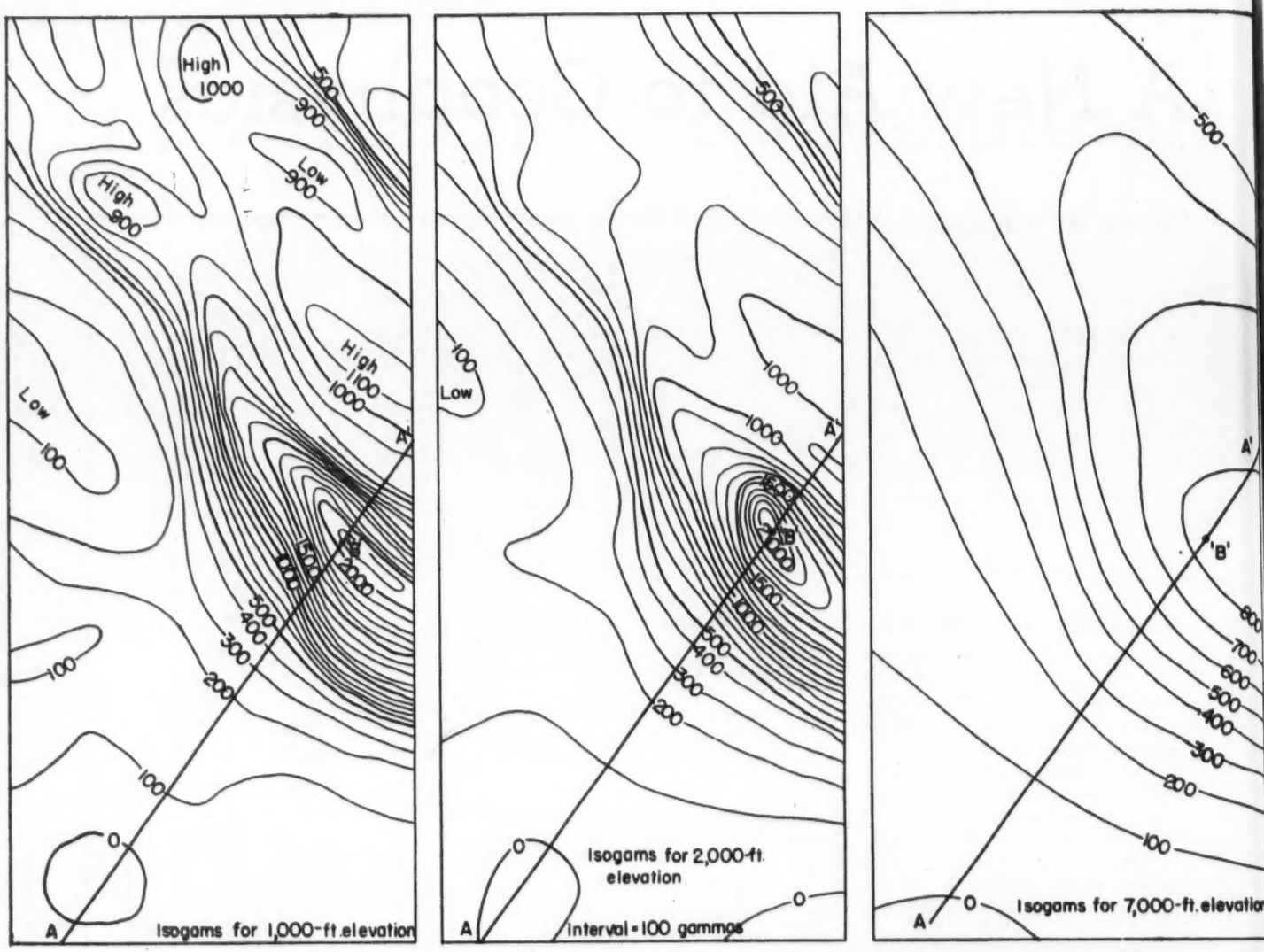
In electrical science, the gauss is used as a unit of magnetic field intensity, but in geophysics a much smaller unit, the gamma, which is 1/100,000 of a gauss, is used.

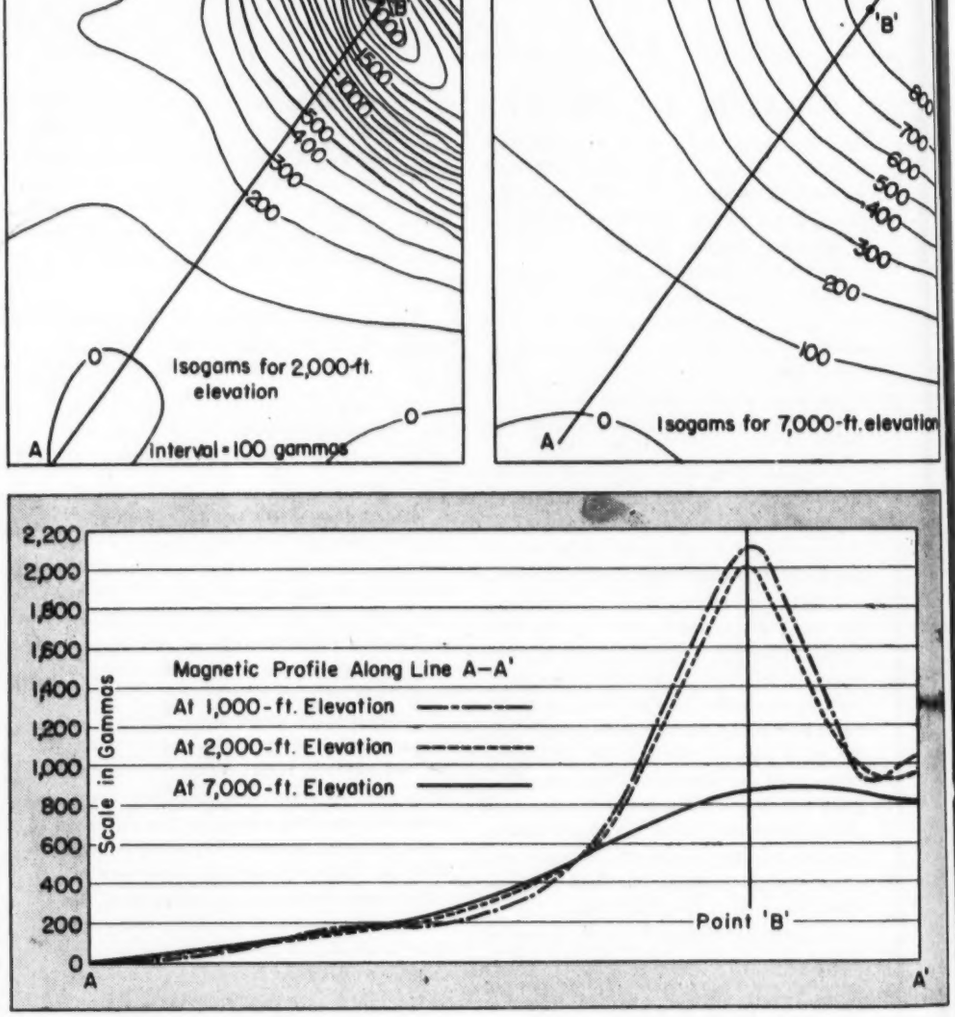
As shown in the accompanying sketch, various components of the earth's field may be measured in surveys. These are generally the horizontal or vertical components, but some equipment, such as the airborne magnetometer, measures the resultant or total field directly. The angle between the horizontal component and the resultant as measured along a magnetic meridian is the magnetic dip at a point on the earth's surface.

Total field intensity on the earth's surface varies from approximately 25,000 gammas at the equator to about 70,000 gammas at the magnetic poles.

Success of magnetic surveys in the search for orebodies is largely dependent upon the tendency of magnetic lines to concentrate in, or to permeate, certain minerals such as magnetite and ilmenite in preference to less susceptible minerals such as calcite and quartz. Furthermore, volumes of granite or serpentine bearing appreciable quantities of magnetite or ilmenite will "attract" a larger number of lines than equal volumes of sedimentary rocks devoid of strongly magnetic minerals. The relatively strong field existing about a body containing magnetic minerals is called an anomaly, and may be detected with a magnetometer, some types of which can measure field differences as small as 1 gamma. Field variation as small as 5 gammas may be significant in working out sedimentary structures.

In addition to regional or local distortions of the earth's magnetic field, several periodic or sporadic variations may occur at any point, and the geophysicist must correct for them when interpreting survey readings. For instance, sunspot activities are coincidental with magnetic storms which may produce variations of several hundred gammas. Regular daily variations, called diurnal changes, as high as 75 gammas occur and are related to the position of the sun on the horizon. Finally, temperature changes may cause expansion in magnetometer parts which will change the sensitivity and require corrections. Other factors may also cause instrument drift.





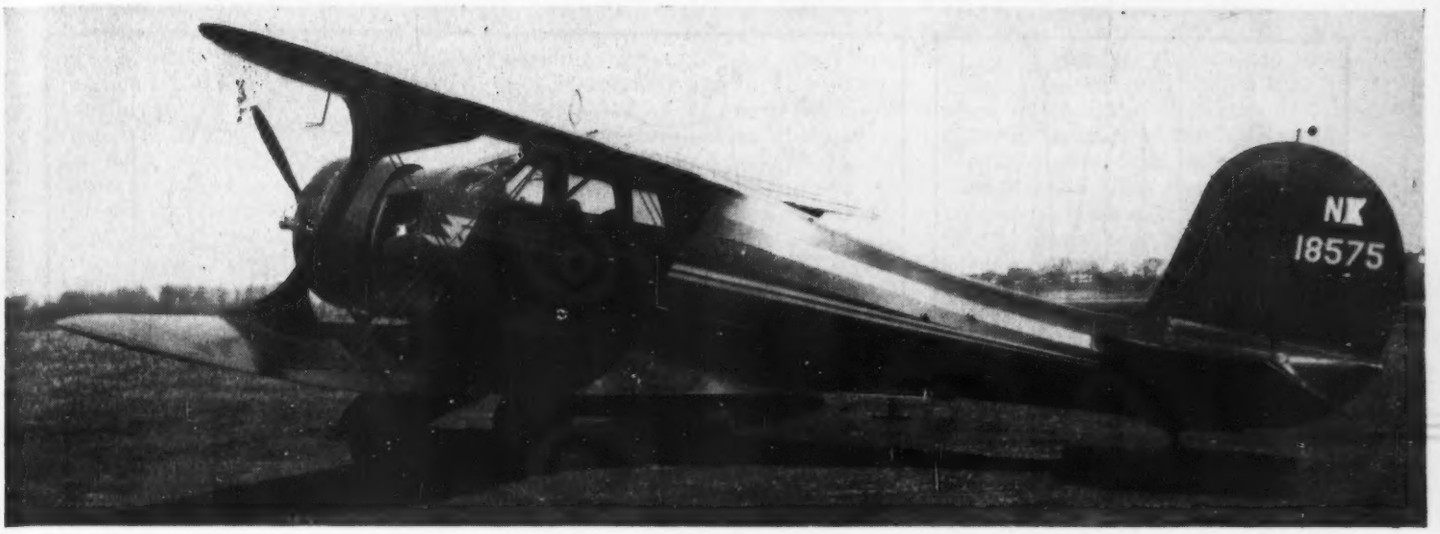
THE AIRBORNE MAGNETOMETER affords an excellent opportunity to investigate magnetic fields in space. These three hypothetical isogam maps and corresponding profiles show typical distortions of magnetic fields over mineral bodies with varying magnetic qualities. Future study of the magnetic fields over known orebodies may aid the determination of the size and depth of unknown orebodies.

Notice how the anomalies attenuate with elevation. This same condition applies to disturbing objects such as pipes, rails, and magnetic boulders which might falsely indicate local orebodies or anomalies in ground operated magnetometer surveys, but which do not influence surveys made by airplane to any appreciable degree.

in Iron County, Mich., sedimentary rocks on the Arctic Slope of Alaska, and magnetic-iron deposits in the Adirondacks. It has also been used with indifferent success for locating sedimentary structures in the Big Horn Basin, Wyoming, the Atlantic Coastal Plain, Maryland, and several places in Oklahoma. In general, areas containing rocks with varying magnetic properties will yield the most conclusive data for this type of reconnaissance work.

Scientists and technicians of the U. S. Naval Ordnance Laboratory and the Bell Telephone Laboratories cooperated early in the war to develop the airborne magnetometer as a submarine detector.

Airborne magnetometers were developed jointly by the Naval Ord-



Early surveys were made with this biplane, but a twin-engine type was later used because of the dangers of low-altitude flying.

nance Laboratory and the Bell Telephone Laboratories, under the auspices of the Navy's Bureau of Ordnance and Aeronautics; by Gulf Research & Development Co., working independently and later under contract with National Defense Research Council; and by Columbia University Division of War Research through its Airborne Instruments Laboratory, also under contract with N. D. R. C.

Members of the U. S. Geologic Survey were consulted to interpret the effects of rock masses on the detector, and in that capacity recognized the potentialities of the equipment as an aid in the Government's intensive search for strategic minerals. Subsequently the Navy Department granted the Survey permission to use the equipment. The Navy Ordnance Laboratory modified the submarine detector to make it into a geophysical instrument according to Survey specifications. In April, 1944, a test flight was run over a traverse near Boyertown, Pa., with a single-engine Beech biplane supplied for the experiment without charge by the Aero-Service Corporation of Philadelphia, which also loaned a pilot skilled in low-altitude flying.

A comparison of magnetic profiles determined from a ground survey and three aerial traverses run at altitudes of 300, 600, and 900 ft. over the same line, and plotted on common coordinates, showed that anomalies could be detected and mapped reliably by airborne magnetometers. Most important was the evidence that the aerial survey could present a better three-dimensional picture of the distortions in the earth's magnetic field, free from the misleading kinks introduced into monoplanar ground surveys by such disturbances as pipes, rails, and fences.

Soon after the initial test the Office of Navy Petroleum Reserves joined the cooperating group consisting of the U. S. Geological Survey, Navy Ordnance Laboratory, and Bell Telephone Laboratories, and as a joint effort, reconnaissance surveys were made in Alaska and various regions of the United States, during which improvements in equipment and technique were devised. At present a twin-engine Beechcraft airplane requiring a 3,000-ft. runway is used to tow a continuously recording magnetometer while a gyroscopically stabilized 35-mm. continuous-strip camera records the position of the plane and keys the magnetic profile to the ground position. The crew consists of a pilot and an equipment operator.

Flying the Traverses

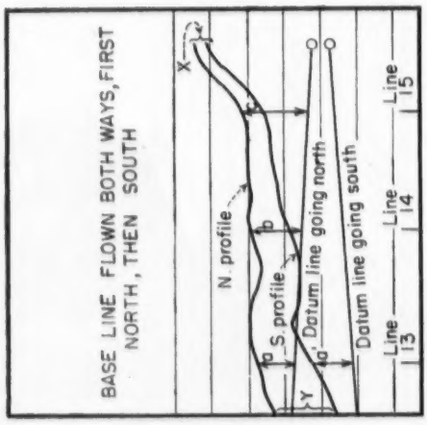
A regional aerial photograph is preferable in planning traverses to be flown for reconnaissance work. These lines are generally plotted ¼ mile to 3 miles apart, 15 to 30 miles long, and at right angles to the "geologic grain" of the area. The pilot guides his flight by recognizable topographic and man-made features intersected by the predetermined plotted lines which appear on the regional photograph. Flying by compass has proved to be completely unreliable. Although the plane can be guided by radar equipment, this method would involve the use of cumbersome ground equipment and could be used only in large areas flanked by high spots which are accessible to trucks.

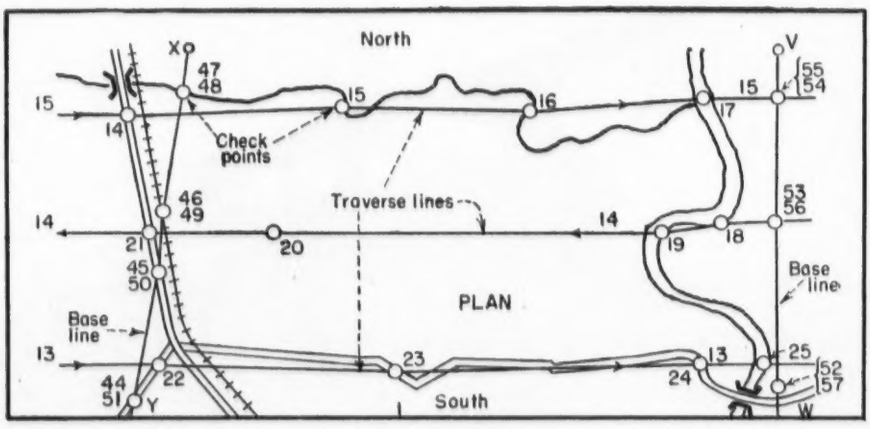
This method, however, is extremely valuable for conducting surveys over large unmapped areas, as for instance the Continental Shelf. A recently completed survey of part of the Gulf of Mexico made in cooperation with the Naval Petroleum Reserves has demonstrated the practicability of such work, which was heretofore wellnigh impossible.

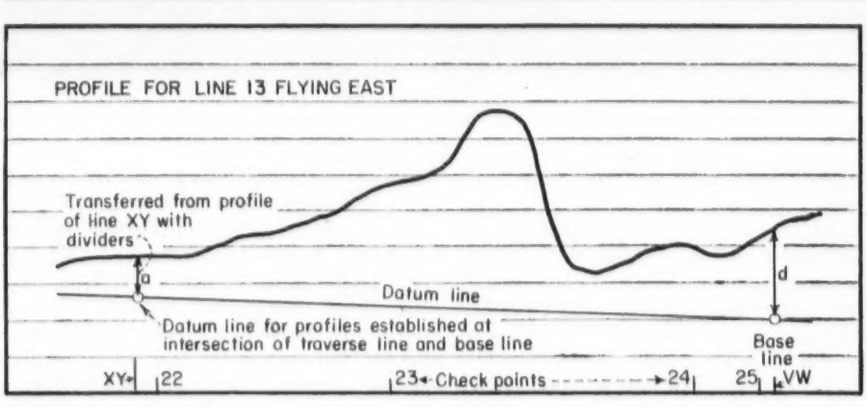
Thus far, for reconnaissance work, the airborne magnetometer has shown some outstanding advantages over the ground-operated magnetometer. Speed is the most obvious of these, particularly if an area to be surveyed is rugged and covered with brush. For instance, in Oklahoma 750 square miles was surveyed in six hours, whereas a ground party would require at least two weeks to do the same job. In May and June 1945, a four-man crew made a survey of 3,170 square miles in the Adirondacks with traverse lines ¼ mile apart averaging 1,000 ft. above ground—a total of 11,300 miles of traverse. Cost of an equivalent survey with a dip-needle would be 17 times as great as the airborne survey and would have required 27 full field seasons with a four-man crew, and about 150 times the total elapsed time. Even then the ground survey would not be as complete or accurate. Thus aerial surveying is cheaper because of the low cost per mile of traverse.

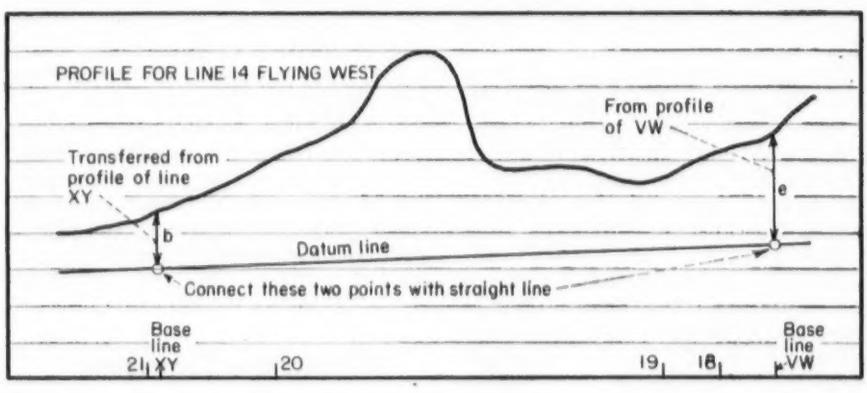
Because of the time interval between observations, the operator of a ground magnetometer must make corrections for changes in temperature which affect the sensitivity of his instrument. Likewise, he cannot disregard diurnal effects, which can cause variations up to 75 gammas during a day of surveying and must be properly distributed over the stations of the traverse. These correc-

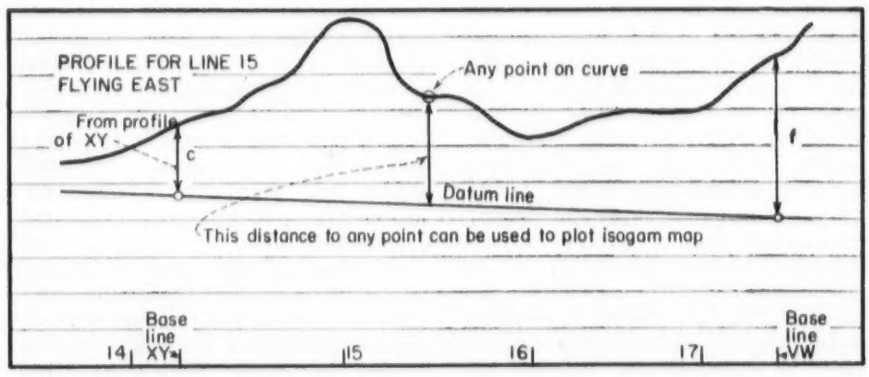
A Method of Tying Parallel Traverses to Common Datum Plane











One procedure for correcting magnetic data for diurnal variation and instrument drift, and for tying profiles of several parallel survey traverses to a common datum plane, is as follows:

1. Fly parallel traverse lines 13, 14, and 15 at a given elevation.

2. Fly base lines *XY* and *VW* at the same elevation to intersect all traverse lines. Each base line is flown over the same path, first north, then south.

3. Replot both curves of magnetic field intensity to eliminate variations in horizontal and vertical scales. Curves for *XY* have been plotted, but similar curves for *VW* have been omitted.

4. Because of the effect of diurnal variations in the earth's magnetic field, and gradual variations within the magnetometer (instrument drift), the two base-line profiles will have the same shape, but not the same recorded value. Note that the recorded values of both *X* and *Y* differ on the profiles for the north flight and the south flight; also that the difference at *X* is less than at *Y*. This is because the time which elapsed between the two readings at *Y* was greater than the time which elapsed between the two readings at *X*. Divergence of the two profiles is a measure of the combined effects of diurnal variations and instrument drift. Divergences increase as duration of the survey increases.

5. Select a magnetic datum level (zero anomaly) so that practically all magnetic anomaly values for the area in question will be positive.

6. Draw straight datum lines for the base-line profiles, so that at any corresponding point in space each of the two curves will be approximately the same number of magnetic units above the datum line. Note that a_1 is the same distance above the south line as *a* is above the north datum line.

7. Determine the points of intersection of the base line and the profile lines for both base line and profile traverses.

8. With dividers, transpose the anomaly at profile intersections on the base line curve (*a*, *b*, and *c* on diagram) to corresponding position on profile curve. In a similar way transpose points *d*, *e*, and *f* from a profile of *VW* (not shown) to profiles 13, 14, and 15.

9. Connect these two datum line points on profile curves with a straight line as shown. The vertical distance above or below this datum or zero line is a measure of the anomaly.

10. Isogam maps, analogous to contour maps, can be prepared by determining points at which the curve is a given number of magnetic units above the datum. Lines connecting points of equal value are isogams.

tions demand that the operator take temperature readings and time readings at each observation, and check back on his base station as frequently as possible. Even then, his corrections will be approximations. Finally, the data acquired will apply only to discrete points, and a contour map can be drawn only after interpolation, also a process of approximation.

In contrast to this technique, the airborne magnetometer affords a continuous magnetic profile tied accurately to the ground and relatively free from influence of diurnal variations, because of the negligible time interval between start and finish of a traverse. Although a slight amount of "drift" occurs within the magnetometer, it is nearly negligible because it is distributed over long distances.

Correcting Diurnal Errors

Minor errors due to diurnal variation and instrument drift can be corrected easily in aerial surveys by a method which is more nearly mechanical than mathematical. One method, as described and illustrated in greater detail on accompanying pages, involves the flying of two cross traverses or base lines approximately at right angles to a series of parallel survey traverse lines. After corrections for diurnal variation and instrument drift for the base lines are made, these base lines constitute a tie between the parallel survey traverses and permit the construction of datum lines to which all magnetometer readings on the traverse profiles can be related. Once these datum lines have been established, the values of points on the traverse profiles can be used to plot magnetic contour maps, or, more technically stated, isogam maps, because the lines of the maps will connect points of equal magnetic intensity expressed in gammas.

The airborne magnetometer is sensitive to variations as slight as one-half gamma, the instrument noise level, and has an instantly adjustable sensitivity from 50-gamma full-scale deflection for a 4½-in. recording chart to 5,000-gamma full-scale deflection. This exceeds the sensitivity of most magnetometers used in ground surveys, and is particularly important when it is realized that variations of a few gammas may be significant in working out structures in areas containing sedimentaries.

Small disturbances on the ground such as pipes, rails, and small local magnetic bodies may indicate falsely the existence of large magnetic structures in ground surveys. However, because these small irregularities attenuate very rapidly with altitude, they do not affect the airborne magnetometer. Data acquired by an aerial survey is therefore more certainly related to actual geologic formations than corresponding data from a ground survey.

Finally, the airborne magnetometer affords a fascinating opportunity to investigate magnetic fields in space. This advantage undoubtedly will be of greater value after more experience has been acquired in correlating measured, three-dimensional fields over known orebodies or structures. Thus practical inferences as to the size, shape, and depth of an orebody may be based not only on the intensity of an observed anomaly, but also on the rate at which that field distortion dies out in space. See hypothetical anomaly shown in contour and magnetic profiles.

However, it should not be inferred that the airborne magnetometer is going to displace the ground magnetometer or other geophysical instruments entirely. The aerial device functions most effectively as a reconnaissance tool in areas where structures include rocks or minerals of varying magnetic characteristics. The scope of exploration must necessarily be regional rather than local. Data acquired will indicate local areas which are most worthy of further investigation with the dip-needle, seismograph, or possibly the diamond drill. One region consisting of granite ridges overlain by sedimentary rocks and glacial drift was surveyed by airborne magnetometer to indicate likely local areas suitable for further investigation by more costly seismograph methods.

Adirondack Survey

The previously mentioned survey in the Adirondacks of northern New York was completed by the Geologic Survey in June 1945, to explore for new deposits of magnetic iron ore. Although regional in character, the survey was planned to cover only those areas which were relatively favorable to mineralization. Favorable areas were ascertained by a study of reports and unpublished data in the hands of the Survey. In general, favorable conditions were expected in predominately igneous terrain where younger granite occurs in association with metasedimentary rock of the Grenville series.

The airborne magnetometer survey was followed by dip-needle surveys run on approximately 50 of the most promising magnetic anomalies. Forty of these turned out to be broad zones of low magnetic intensity. Three of the remaining 10 had good potentialities, and three, fair potentialities. Two hundred anomalies remain to be scouted.

REFERENCES

"Exploration Geophysics." J. J. Jakosky. Times-Mirror Press.

"Applied Geophysics in the Search for Minerals." A. S. Eve and D. A. Keys. Cambridge University Press.

"Elements of Electricity." William H. Timbie. John Wiley & Sons, Inc.

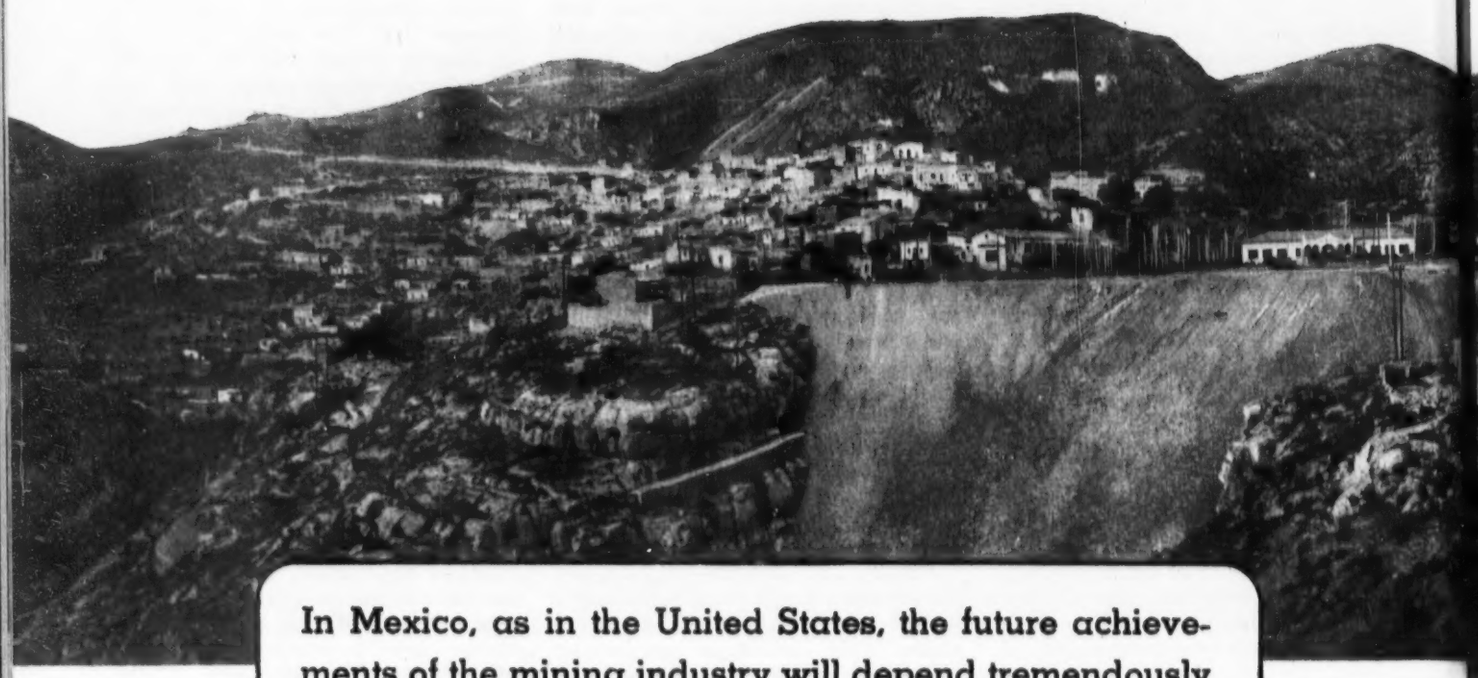
"Mining Engineer's Handbook." Robert Peele. John Wiley & Sons, Inc.

Federally Owned Lands in Western States

OF THE 1,905,361,920 acres of land in the 48 United States, 455,183,251 acres were Federally owned on Jan. 1, 1944. More than 80 percent of the Federally owned land is public domain. The remainder has been purchased for Federal purposes, and is not ordinarily subject to public land laws. Ninety percent of the public domain is in the 11 Western states as tabulated, but most of this has been withdrawn from homestead settlement or other appropriations by the public. The principal reservations in the Western states, involving overlapping acreage, are: national forests, 135,048,000; grazing districts, 140,798,000; Indian reservations, 43,881,000; national parks, 11,539,000; soil conservation, 4,218,000; Navy Department, 758,000; War Department, 14,021,000; fish and wild life, 883,000. Data from U. S. Chamber of Commerce report.

State	Acres in Federal Ownership	Percent of State Area
Nevada	61,378,360	87
Utah	37,898,177	72
Idaho	33,730,114	64
Wyoming	32,056,721	51
Oregon	32,781,306	53
Arizona	53,363,273	73
California	46,484,371	46
Colorado	25,492,803	38
New Mexico	34,211,071	44
Montana	32,966,241	35
Washington	15,034,462	35
Total	405,595,899	Aver. 54

MEXICO IS STRANGLING



In Mexico, as in the United States, the future achievements of the mining industry will depend tremendously on the encouragement that the people and their government extend to a spirit of enterprise in mining

EVAN JUST
Editor

BEING INTERESTED in observing at first hand what has happened to Mexican mining in recent years, and in appraising its postwar future, we went to Mexico to size up the situation. What we observed was a clouded picture, qualified as to natural opportunities, tax policies and labor problems. The investor who commits himself to Mexican mine development today must have more than ordinary courage, patience, and faith in the eventual outcome, principally because of man-made difficulties.

Taxes Are Confiscatory

The plain fact is that between the insatiable tax impositions of a Government which depends heavily upon mineral production for its revenues, and the demands of a labor movement which, like much of our own, seems unable to refrain from reducing employment opportunities, the mining industry of Mexico is simply being strangled to death.

One need look no farther than the recent statements of two prominent Mexican mining men to realize the gravity of the situation which Mexican mining faces. Señor Constantino Perez Duarte, in illustrating the dilemma of Mexico's small producers (*E. & M. J.*, December, 1945, p. 97), pointed out that between 1937 and 1944 the number of ore shippers declined 55 percent while the tonnage shipped fell off 30 percent. The decline was steady throughout the seven years despite the stimulating effect of wartime prices, the largest loss being between 1943 and 1944.

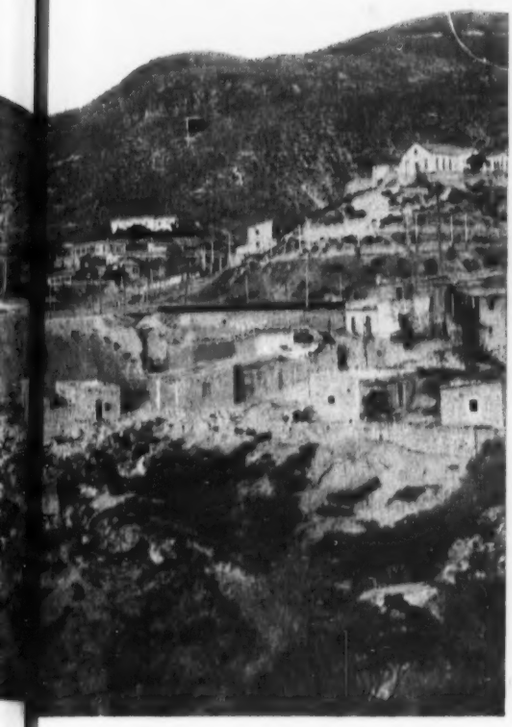
In February Raul Madero, director of the Fomento Minero (Government agency fostering mineral development), issued a frank statement (published in the Mexico City newspaper *"Excelsior"*) that Mexican mining is in critical condition, that taxes are at confiscatory levels, and that if the industry is to be saved, taxes must be substantially reduced, roads constructed and Government-financed beneficiation plants established. Sr. Madero quoted figures compiled by Lic. Alberto Terrones Benitez showing that taxes on the mining and metallurgical industry between 1937 and 1944 had risen from 22.0 to 35.5 percent of the gross value of output.

The most recent major event in Mexican mining economy occurred when the price of silver advanced from 45 to 71c. per oz. Of this 26c. gain, the Government immediately took 14c., exclusive of income tax. Then labor moved in, and after a strike of several weeks' duration, extracted from most of the production a toll greater than what the Government had left. These actions put many producers in such distress that in early April the Government receded a little by cancelling the *aforo* tax on silver, amounting to 3c. per ounce.

Mexican Owners Are Hit

It should be borne in mind that, notwithstanding the hardships which foreign-controlled operations are experiencing, the most serious sufferers have been Mexican-owned. In the late thirties, 70 percent of the properties were owned by Mexican cap-

ITS MINING INDUSTRY



VIEW OF EL POTOSI and A. S. & R. headquarters at Santa Eulalia, Chihuahua. Colonia Naples on left.

ital. The mortality among this group in recent years has been catastrophic. So much of Mexican mining has been forced to the wall that today it is threatened with extinction. The eight major foreign-controlled organizations, whose properties are comparatively large and efficient, have so far survived the rising tide of difficulties. Seven of these organizations are American-controlled; one is English.

Natural Obstacles Exist

These handicaps would seem less discouraging if Mexico offered easy natural opportunities to develop rich resources. Unfortunately, this is not the case. Mexico presents natural obstacles to successful development that would make cautious investors weigh their chances carefully even if man-made conditions were propitious. The easily discovered rich deposits were developed long ago. Those that remain unexploited are hidden, of uncertain value, or have transportation handicaps. Lack of transportation is an outstanding obstacle.

More than half the mining men who are familiar with Mexican conditions say that the country's best days are over in regard to mineral wealth. Many of them hold to this viewpoint even though their self-interest would be better served by an optimistic attitude. They point out that the Spaniards were successful in locating mineral deposits. Despite the inconveniences and hazards of exploration in those colonial days, the Spaniards, or the natives before them, mined in every district of the entire country that has yet been proven to be important.

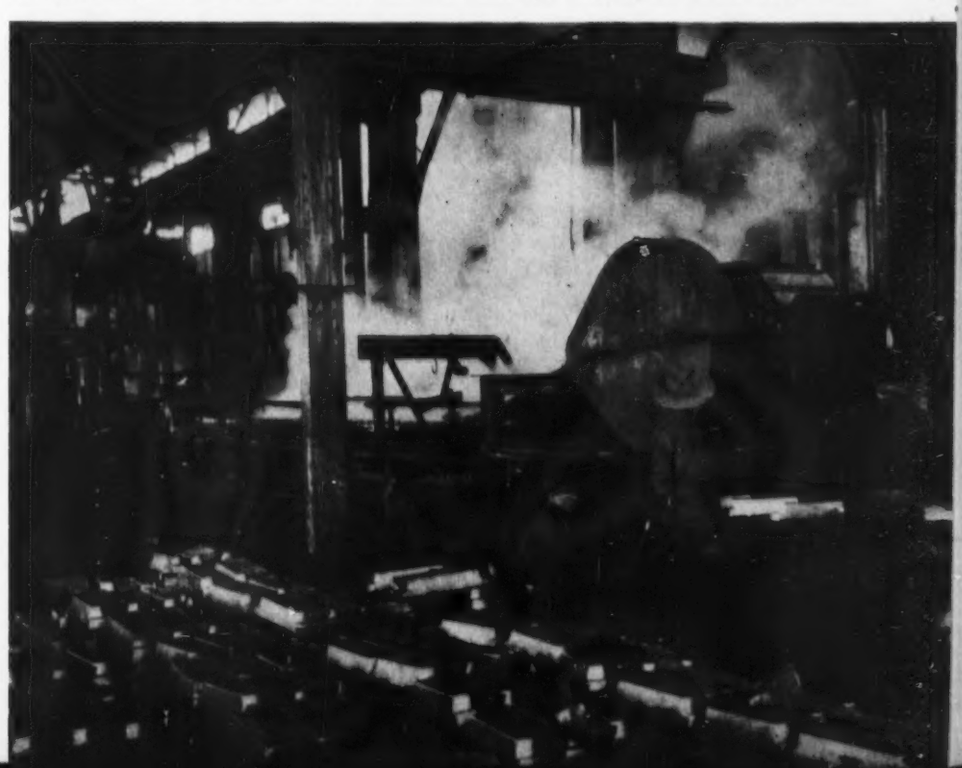
Encouragement Wanted

We are not ready to agree that Mexico must expect a declining future as a mining country and content itself more or less with mining out its known deposits. As is also the case in the United States, an unenlightened public attitude can produce this result. However, in either case encouragement of the spirit of enterprise, as to research, discovery and investment, can make the future greater than the past. Reasoning on the basis of geological knowledge, a country that is mineralized as broadly as Mexico must have many concealed deposits; enterprising science can learn how to find them. A country with a large, relatively inaccessible cordillera must have base metal and nonmetallic resources that lack of transportation facilities has prevented from arousing interest; enterprising capital could provide transportation (now largely Government-operated, inefficient, and perpetually short of finances). A country that has widely scattered rich resources must have abundant leaner ones; enterprising research can learn how to utilize them economically. In Mexico, as in the United States, the future achievements of the mining industry will depend tremendously on the encouragement the people and their governments offer to a spirit of enterprise in mining.

Labor Difficulties

Under the administration of the Mexican labor law, mine managements are very much at the mercy of their labor organizations. As in this country, the law compels operators to deal with their workers' organizations. However, they do not have the recourse which is still available to management in the United States; they cannot resort to lockouts, nor are they even free to cease operating if the demands of labor make operations unprofitable. The Mexican law recognizes a job as an equity. Its owner must be compensated if the job is destroyed, even though the loss is the result of economic conditions outside the control of the employer. This is what actually hap-

CASTING LEAD in Chihuahua smelter. American Smelting & Refining Co., Chihuahua, Chih.



pens under the present interpretation of the law, despite certain articles which stipulate that, if a deposit is exhausted, the owner is entitled to close down with very small payments to the workmen. The labor law specifies means of settling strikes and laying off of workmen, but, as in this country since the New Deal, the administrative attitude is compliant with the wishes of labor organizations. The law also recognizes any disability from accident or occupational disease, such as silicosis, as requiring compensation. Thus, if a company wants to reduce operations and keep its property, it must pay each workman a substantial sum for depriving him of his job, plus compensation for any statutory disability. As a result, unless output is increased, labor-saving devices cannot be used to reduce costs. To meet their labor obligations, operators in Mexico are commonly driven to tolerating practices which they know to be inefficient. In many cases, if not all, the accumulated drags on efficiency are shortening the lives of the properties, by the neglect of low-grade ore.

Since the enactment of the present labor law, except in a few cases, companies whose operations have become unprofitable have found it necessary to pay off their workmen on an exorbitant basis to retain their properties. In many cases, companies have found it more feasible to surrender their properties and plants to their labor in lieu of other compensation. On most of these occasions, the workers have organized co-operatives to carry on mining operations at these properties with some Government assistance.

Co-operatives Unsuccessful

Typically, the history of these co-operatives has been a succession of difficulties. Theoretically, they should be able to go forward, for a while at least, with fair success, as they are relieved of the heavy taxes which burden other producers. However, between occasional corruption and their inability to develop efficient managements, the workmen usually earn far less than before they displaced the previous owners. Also, safety and medical services lag, and operations are subject to frequent interruptions for lack of maintenance or good equipment. Most of the co-operatives are in debt up to the limit of their credit and are obliged to call on the Government from time to time for financial assistance. Thus, a former source of tax revenues frequently becomes a drain on the public treasury. Today the co-operatives are on the decline, and complete lack of development work is shortening their lives. Only a few survive out of the several that were set up. The net effect of cooperatives has been to decrease employment markedly.

Union Hampers Efficiency

One of the tragedies of modern labor relations in Mexico, to the ultimate detriment of workers as well as management, is the extent to which union organizations stand in the way of efficiency. Men cannot be discharged except for the most flagrant offenses, such as sabotage or theft. Even in these cases, complete proof must be furnished. The disciplining of men for inefficiency is resisted at every turn. Thus, output per man is very poor, except where incentive wages are invoked. Operators generally characterize Mexican workmen as good miners when discipline can be maintained, but poor under present conditions, particularly in the southern part of the country.

Commonly, contracts embrace other deterrents to efficiency. Many contracts require replacement of a workman if he leaves, thus preventing reduction of the labor force. Promotion of "non-confidential" supervision is by seniority; thus, except for men whose disqualifications are extraordinarily obvious, a picked group of foremen cannot be selected.

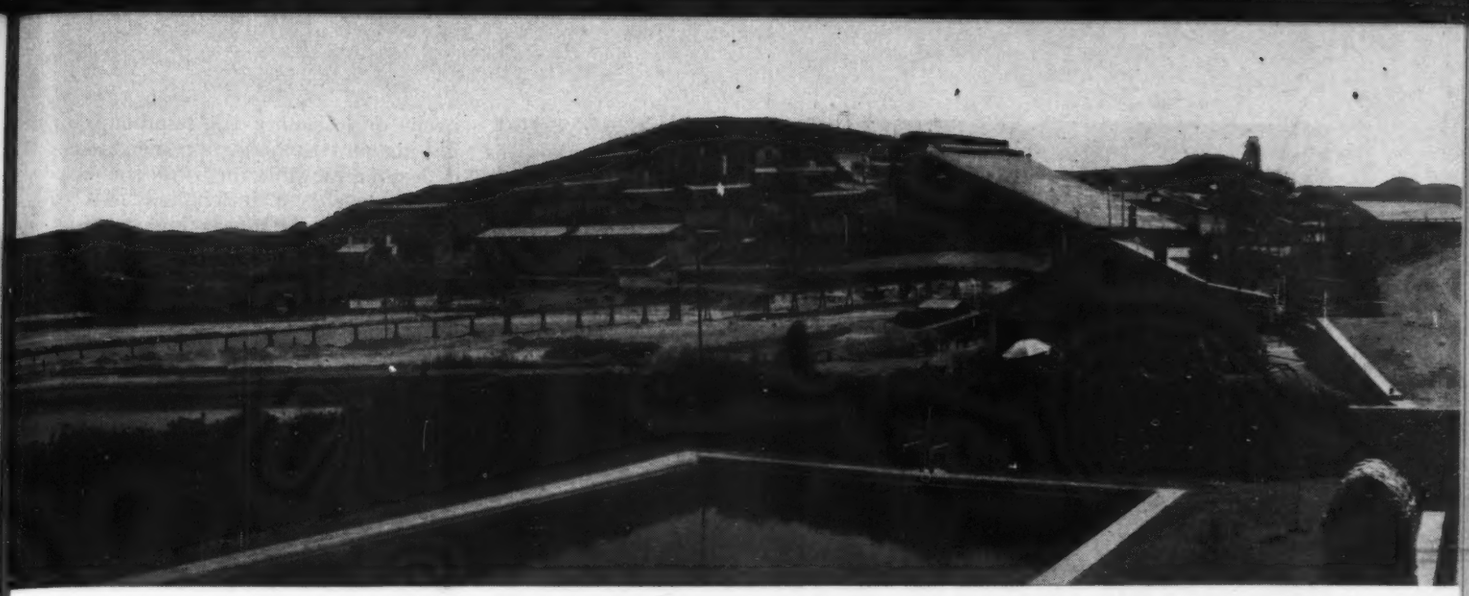
Also, it is impossible to keep bright young men long enough for them to grow into supervisors. They can do better for themselves elsewhere than to await promotion on a seniority basis. Moreover, foremen (non-confidential) belong to the union. Either for fear of discrimination in union circles or because they accept the union philosophy toward efficiency, foremen are disinclined to discipline the men under them.

The lackadaisical attitude of railroad labor toward efficiency, plus equipment shortages, poor maintenance, and incessant breakdowns, have been serious handicaps to mining. Small operators, particularly, have been affected, as they lacked capital to survive if their output was not delivered to smelters. During and since the war, transportation in Mexico has been utterly chaotic and near collapse. Also, a lack of railway connections has held back development in the more remote areas.

Another deterrent that handicaps the development of new properties consists of the extensive facilities which employers must provide. In addition to precautions for safety and health on the job, which modern good practice demands anywhere, companies are required to provide schooling, hospitals, medical care, housing, water, and sanitary facilities. Despite their social desirability, these facilities are expensive. It takes a large proven orebody to assure their being paid out. Small enterprises cannot stand these excessive expenses.

In brief, although the status of Mexican labor some years ago may well have called for measures to improve wages and working conditions, at present policies dedicated to that end are being so indiscriminately applied that they threaten to destroy the jobs and earning power without which additional benefits are meaningless.

SLAG-DISCHARGE-END VIEW of lead blast furnaces, Torreon smelter of Cia. Metallurgica de Peñoles, S.A., Torreon, Coahuila.



CYANIDE PLANT and concentrator, Parral Unit, Cia. Minera Asarco, Parral, Chih.

Depressing Tax Outlook

Notwithstanding these labor restrictions, which would deter most people from starting a new enterprise, mining managements in Mexico fear their labor problems less than the outlook for burdensome taxes and restrictions by Government. They recognize that their workmen, despite their mistakes, are individualists and generally men of good will. Thus, they have hopes that over the long pull reason will prevail, if the operations can survive. On the other hand, the tendency toward higher taxes and other Governmental curbs seems to have a vitality quite independent of the views of the individuals in administrative posts. The individual officials can often be convinced that policies have passed the point of diminishing returns; nevertheless, the burdens continue to mount. Mining men cannot foresee the end of this tendency, at least with themselves still in the picture.

Mines Are Chief Source

The resistance toward lightening the tax burdens whose weight is rapidly destroying Mexican mining is not because Government officials have sinister intentions or lack good will. Their desire to keep the industry alive is indicated by the relief they have granted in dire emergencies, exemplified by the recent cancellation of the *aforo* tax on silver and by a subsidy granted during the first 10 months of 1945 to producers, the value of whose output was 80 percent or more from precious metals. The basic difficulty is that the Government depends heavily on mineral taxation for its revenues and has not yet devised any other base on which to rest taxation of the present magnitude. Outside of reducing Government expenditures, the logical alternative is to relate taxes to profits rather than gross values and spread the burden more evenly over the country's growing list of industries. Such a course would immediately convert great tonnages of rock to ore and thus be a move in the direction of sound conservation and maximum employment. Also, many competent people believe that the consequent expansion of mining activity would tend to equalize the revenues exacted from the mining industry. In any event, it is evident that if the Mexican Government continues its present policies of mineral taxation, before long it will have to accept less revenue from mining, as the latter will simply cease to exist as an important industry.

There are more than 30 taxes which the Mexican mining industry pays directly or indirectly, but the principal ones are the production tax, export (*aforo*) tax, stamp tax, and income tax.

The production tax is the modern expression of the "King's Fifth." At present it varies with the different metals and their state of refinement, the graduations being made so as to discourage the exportation of ores and concentrates, in comparison to refined metals. The following rates are representative:

	In Concentrates	Refined
Gold	20.0%*	19.9%*
Silver	26.0	25.0
Copper	4.6	3.5
Lead	6.8	5.2
Zinc	4.2	3.6

*Includes supplementary tax on gold.

The official values against which these percentages are applied are approximately equal to U. S. ceiling prices of the metals and are thus much greater than the prices actually received by Mexican producers by the amount of charges such as freight, treatment charges, and taxes. In the case of minerals like zinc and mercury, which have been returned to private trade, the duty also reflects back on the producers. Also, when the smelting losses are considered, the tax on the cruder material becomes even higher.

Purpose of Aforo Tax

The export (*aforo*) tax was instituted when the peso was devalued in 1938, to appropriate the benefits that exporters would receive. The 12 percent rate is constant, but assessed values against which the tax is computed are changed from month to month according to arbitrary determinations of the change in economic conditions. The domestic costs, which in 1938 would have given exporters an advantage were it not for the *aforo* tax, have long since increased sufficiently to more than wipe out any possible advantage, but the *aforo* tax remains nevertheless. It is mitigated only by the circumstance that the values of the metals are assessed at lesser figures than are used for the production tax and that differentials apply in favor of cruder materials. The *aforo* tax at present amounts to approximately the following percentages of the actual values of the metals: silver, 4.6; lead, 7.3; copper, 8.1; and zinc, 8.2. In early April, to relieve the desperate position of many producers, the *aforo* tax on silver was waived by decree.

In brief, the values on which the tax is based are more realistic than those used for the production tax, but the fundamental reason for ap-

VISITING THE EAGLE-PICHER (Minas de Guerrero) property at Taxco. Left to right: Evan Just, E. & M. J.; Frank Zironi, mine superintendent, A. S. & R. Pedregal mine, Taxco; Jack McCarthy, assistant manager, Minas de Guerrero; A. W. Edelen, assistant manager, A. S. & R. Co., Mexico City; J. C. Rule, mine superintendent, Minas de Guerrero.

plying the *aforo* tax has disappeared. In fact, if the Government were to apply the principle of the *aforo* tax consistently and should undertake to equalize the differentials between the costs of domestic producers and their foreign competitors in comparison to 1937, it would now be paying Mexican producers a bonus instead of extracting a tax.

At present the *aforo* tax on gold is waived in favor of a "Supplementary Tax on Gold," bringing the total production tax on gold to 19.9 percent.

Taxes Exceed 50 Percent

To illustrate the weight of the production and *aforo* taxes on mining, the average Mexican lead-zinc operator markets a lead concentrate, usually containing varying amounts of gold and silver, and a zinc concentrate. A 60 percent lead concentrate containing the average amount of silver and gold has been returning about $65 (U. S.) per metric ton to the producer. The production tax on such a concentrate amounts to $11.76 and the *aforo* tax to $6.70, per metric ton. Hence, just these two taxes take $18.46 (U. S.) per metric ton. This sum is 28.4 percent of what the producer gets. High as this is, that on the zinc concentrates is even greater. A 55 percent zinc concentrate currently being marketed in the U. S. returns the Mexican producer about $16.65 (U. S.) per metric ton. The production tax on such a concentrate amounts to $4.93 per ton and the *aforo* tax $5.94 per ton. The two taxes amount, therefore, to $10.87 (U. S.) per ton of zinc concentrates. This sum is 65.3 percent of what the producer gets to pay all his operating expenses and meet taxes.

The stamp tax is applied at the rate of 1.65 percent of gross receipts. However, this tax is paid by all sellers. In the case of ores and concentrates sold to smelters, the shippers pay the tax on their shipments and the smelter pays again on the sale of metal.

The income tax is graduated up to 30 percent of net income. In addition there is an 8 percent tax on dividends and undistributed profits. Mine operators do not have depletion allowances based on value of the property or corresponding to percentage depletion, but are permitted much smaller deductions, either 5 percent of cost or an arbitrary allowance.

When it is realized that smelting is more or less of a toll operation and that the burden of taxation necessarily reflects back to the miner, it becomes apparent that the total tax burden on the gross receipts of the mines is in excess of 50 percent (being 35.5 percent of the value of combined mine and smelter output).

There has been some talk in official circles of affording relief to low-grade operations, also of rebating a portion of taxes to subsidize exploration. However, these ideas have not materialized. From time to time politicians make statements that indicate a vague consciousness of the need for lessening the handicaps of mining, but their reassurances rarely assume tangible form; on the contrary, nearly all action has been in the direction of increasing the burdens and of encouraging labor to do likewise.

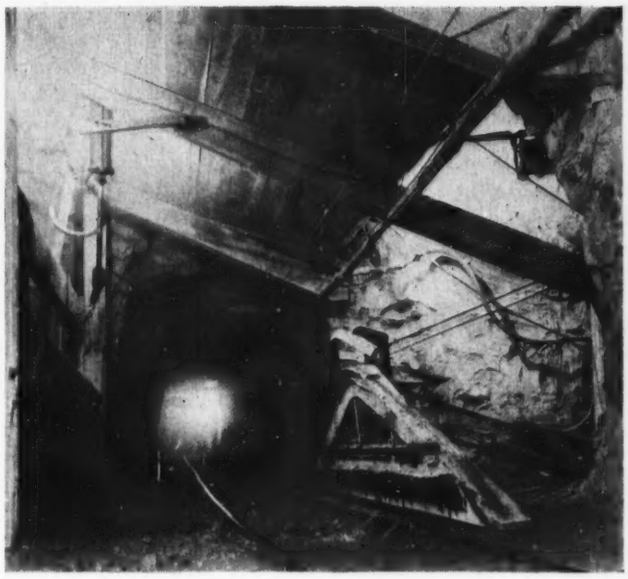
One cannot meet and mingle with the Americans who manage mining and smelting operations in Mexico today without feeling proud of their enlightenment, integrity, and competence. Far from being ruthless exploiters of the country's wealth, they fully recognize the right of the nation to reap the principal benefits of its development. They sympathize with the Mexican people, their desire to enjoy better living standards, and to develop their own self-sufficiency. Fully as strong as the personal disappointments of these men are regrets that so often developments react against the best interests of the country. The demands of labor frequently reduce employment, high taxes prevent development and thus limit the tax base, and the discouragement of efficiency limits the earnings of good workmen. The combination of taxes, labor benefits, and restraints on managerial efficiency forces wasteful mining and limited exploration. The greatest yearning of these mining men is for a chance to do their jobs to the maximum advantage of everybody concerned, to explore fully, to mine and treat efficiently, and to pay good wages for work well done. Unfortunately, the present drift of conditions affords no prospect of such an opportunity.

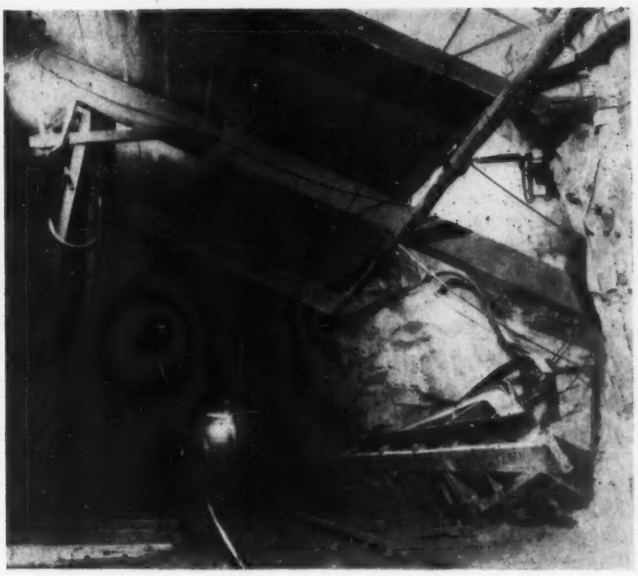
Hopes for Future

While there is life there is hope. We can hope that the enlightenment shown at the Chapultepec conference, which led to the endorsement of the Economic Charter of the Americas, will yet bear fruit and permit the people of this hemisphere to use their abilities and resources to maximum mutual advantage.

For the Mexican people we can hope that their Government will find the means of affording their mining industry reasonable treatment before the present drift of policy does serious and permanent damage to this fundamental part of the country's economy. As stated, we do not share the viewpoint that the natural opportunities have all been exploited. However, it is clear that if Mexico is to have a flourishing mining industry in the future, the attitude of Government and labor must change from "charging all the traffic will bear" to one of positive and enlightened encouragement.

Retractible Ramp Reduces Mine Car Wear

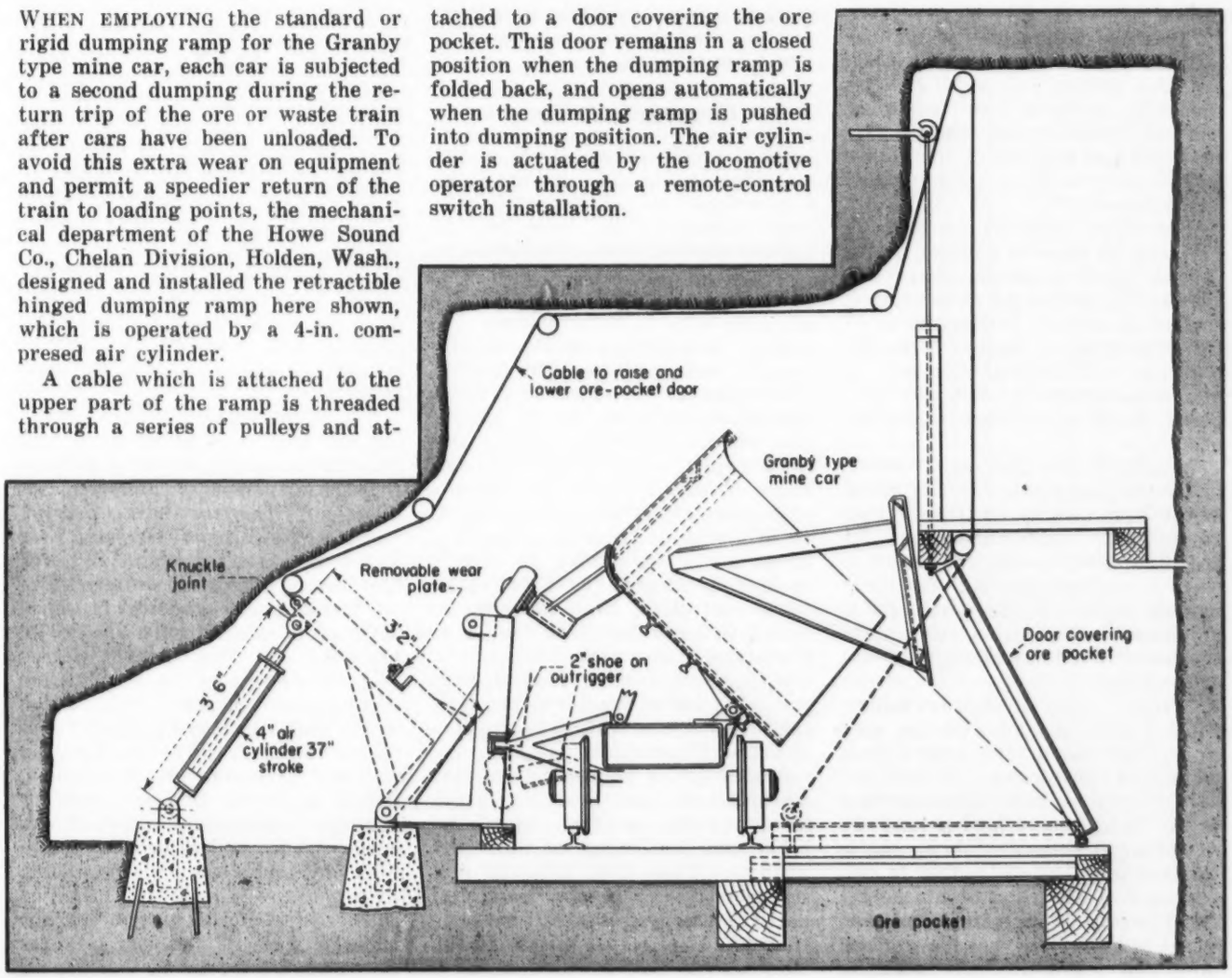




DUMPING RAMP, shown at left, is pulled aside after train is unloaded.

WHEN EMPLOYING the standard or rigid dumping ramp for the Granby type mine car, each car is subjected to a second dumping during the return trip of the ore or waste train after cars have been unloaded. To avoid this extra wear on equipment and permit a speedier return of the train to loading points, the mechanical department of the Howe Sound Co., Chelan Division, Holden, Wash., designed and installed the retractible hinged dumping ramp here shown, which is operated by a 4-in. compresed air cylinder.

A cable which is attached to the upper part of the ramp is threaded through a series of pulleys and attached to a door covering the ore pocket. This door remains in a closed position when the dumping ramp is folded back, and opens automatically when the dumping ramp is pushed into dumping position. The air cylinder is actuated by the locomotive operator through a remote-control switch installation.



Whales Survived, But Dinosaurs Didn't

E. H. ROSE, International Nickel Co., Copper Cliff, Ont.

"And whither the design of flotation machines?" asks Mr. Rose. Here is his answer to our answer (*E.&M.J.*, March 1946, p. 67) to his statement (*Mining and Metallurgy*, Feb. 1946, p. 73) that the trend toward big flotation machines might well be reappraised.

AN EDITORIAL in the March issue of this journal challenged a statement of mine in the February *Mining and Metallurgy* to the effect that "manufacturers might do well to reappraise the trend toward jumbo flotation machines."

"To those designers who may be inclined toward such reappraisal," say the editors of *E.&M.J.*, "we should like to say a word for the big machines. Back in January 1944 we said that one demand of the future will certainly be for flotation cells of larger capacity."

When this editorial came to hand, it caused an anxious moment, lest a suitable rebuttal should prove elusive. In this particular circumstance, a good Samaritan in the person of Prof. Benjamin F. Bailey, of the Department of Electrical Engineering at the University of Michigan, happened by at a most opportune moment.

Writing in *The Michigan Technic*, under the happy title of "The Battle of the Squares and the Cubes," Professor Bailey points out what everybody knows but usually forgets: that there is one optimum size for every moving thing of this earth, be it animal or be it machine, for a given species or function under a given set of conditions.

"Trees," says Professor Bailey, "do not grow beyond a certain size. Fortunately for us, the same is true of rats and mosquitoes. Whales are so big because they weigh nothing in the water, but a land animal the size of a large whale would be unable to stand up. A man's weight is proportional to the cube of his height and his food requirement is proportional to his weight, but his stomach area and his ability to assimilate food are proportional only to the square of his height. The area of his skin and lungs is likewise small compared with his weight."

Pity the human suddenly become a giant; if he did not suffocate first, the poor fellow would starve to death —in a supine position—since his legs would have broken.

Growth Isn't Easy

Let the millman look at any of the machines he uses. They have come to a certain size and there they have been stopped by the battle of the squares and the cubes. Furthermore, increased size has invariably come as the result of discoveries that did not have size as their primary objective. Improved strength of materials, better alloys, fundamental discoveries in dynamics have made greater size possible. As the editors say, you cannot build a bigger machine merely by increasing its dimensions. Where is the 15-ft. Symons cone crusher? Where are the 20x20-ft. ball mills, and how much would a crane cost with which to handle them, fully loaded? Even in regard to over-all plant, Utah Copper preferred to build two 50,000-ton concentrators rather than one of 100,000 tons, and, further, each of these was composed of smaller plants (sections) under one roof, as is the condition at Morenci.

The design of mechanical flotation machines of even the size we now have was not practical merely by hiking the dimensions of their progenitors. There had to come first the perfecting of vertical motors, of anti-friction bearings, of shafting that would not whip. In the miraculous process that goes on inside a flotation machine, we do not use one big bubble; instead we use a few trillion trillion small ones, and down to a limit, the smaller they are the better we like them, even though we do try to build a whale's belly to contain them.

How big can a flotation machine be? After all, there are not so many dimensions to work with, and the problem ought therefore to be relatively simple. Dimensionally speaking, you can change length, width, or depth, neglecting time as a dimension which, in flotation, is a function of these. In mechanically agitated machines, even these three dimensions reduce to two for the individual cell, as length and width must be served by the single dimension of impeller diameter.

Right there we come upon the battle of the squares and the cubes. Volume of a cell is a cubical function, but the effectiveness of the impeller as an aeration mechanism is proportional to not more than the square of the diameter at a given rotational speed. The jumbo flotation machine faces the same fatal difficulty as the giant cubical man whose aeration apparatus increases only as the area of his lungs.

One might argue with this, pointing out that it is power that produces the aeration. Power is a linear function of impeller diameter, as Professor Taggart says in his "Handbook of Mineral Dressing." It might be inferred that diameter could be increased indefinitely without loss of power economy, and that after all is one thing we are vitally interested in. But, alas, Professor Taggart goes on to say that volume of air does *not* increase in proportion as the diameter is increased, so that larger impellers give less aeration per unit of power. It would be a losing game to increase impeller diameter inordinately except as one can accept power loss up to a certain limit, by virtue of some byproduct economies.

The battle of the squares and the cubes is at work none the less, for centrifugal force is an exponential

function. The greater the diameter of an impeller, the more slowly must it revolve, lest it fly apart. At the same time, the wear upon it increases as something like the sixth power of peripheral speed, which is bad news in anybody's cost sheet.

Another vital function of flotation machines, equal in importance to that of aeration, is the keeping of the non-floating solids in suspension (whose weight, by the way, is a cubical function). Now we are into depth as one of the dimensions which might be jumboed. We have a job of lifting, which the impeller must do—and in a direction at right angles to its plane of rotation. As for depth, flotation engineers have long years of empirical experiment behind them, through a range from a few inches to a dozen feet. In every circumstance, speaking of mechanical machines, the battle of the squares and the cubes has set a limit upon depth. Why toss barren sand higher than it needs be tossed, when the only reason to toss it all is to keep it in suspension for a sufficient time for enough bubbles to find those grains which, unlike the barren sand, are worth looking for? In the famous Morenci test of six different makes of flotation machine, it is a matter of common knowledge that the deepest cell had to be made shallower to stay in the race at all. And it was, by the way, a relatively shallow cell which eventually won out.

Length Cheaper Than Depth

However, the bubbles do have to get in and look around. It could be argued that the longer their path of travel the better their chance of finding something. A mechanical flotation machine is an air compressor. Because the power to compress air is a linear function of mean effective pressure, it would seem that depth (hydrostatic head) would impose no penalty upon power economy as regards compression, and indeed perhaps it does not. The longer path of travel in a deep cell would give a bubble more opportunity to get fully loaded, and hence supposedly a higher flotative efficiency per unit of power. But if the bubbles become fully loaded quickly, as they do at the feed end of a machine, provision of longer travel is only a waste of energy (if we may disregard other factors). At the tail end of the machine, there might indeed be a point to deeper cells and longer bubble trajectory, as there are fewer value-grains and there is less chance of contact. But all the barren gangue is still there, to be tossed wastefully into reluctant suspension, and general practice indicates that length has been found a cheaper dimension to increase than depth. In other words, one adds more cells of the same size until the Law of Diminishing Returns calls a halt.

Number of Machines of a Given Size to Total 1,000 Cu. Ft. of Volume

Vol. of Cell, Cu.Ft.	No. of Cells Required	Saving in No. of Cells Compared With Preceding Size
1	1,000	...
10	100	900
50	20	80
100	10	10
200	5	5
500[a]	2	3
1000[b]	1	1

[a]Super-jumbo. [b]Extra-super-jumbo

With few exceptions, the objective sought in designing bigger flotation cells is cost, not metallurgy. Little evidence has been published to demonstrate that larger mechanical cells will deliver better metallurgy than those of medium size. On the contrary, as said in *Mining and Metallurgy*, I have evidence in records and correspondence that the opposite is true when individual cell volume gets up to about 100 cu.ft. But cost is something else again. It is perfectly true that bigger machines make for smaller floor space, less capital cost per pound of machine or ton of capacity, less building to house them, and fewer units requiring operating attention and maintenance. But look out again for the battle of the squares and the cubes.

Consider a plant requiring 1,000 cu.ft. of flotation machine volume. It is simple to calculate how many cells of given size are needed.

It is obvious that one would realize a major economy by using 10 cu.ft. machines in preference to machines of 1 cu.ft. The saving is very substantial in increasing further to 50 cu.ft. At 100 cu.ft. the saving is enough to have attracted many plants to that procedure. But at 200, 500, or 1,000 cu.ft.—if some genius could make such a machine work—the gain tapers off sadly.

And that is not all. The larger the machine, the greater the loss in plant capacity when that machine is idle for repairs or other reason. The greater is also the number of related machines that must be taken off the line at such times—grinding mills, classifiers, pumps, etc., all of which represent capital investment that should not be loafing.

I did not, and will not now, attempt to quantify my term "jumbo," though the editors must have had something larger than 100 cu.ft. in mind when they made their behest in January 1944, inasmuch as the No. 30 Denver was then on the market. [Ed. note: So we did.] Suffice it to say that mechanical flotation machines today have stopped in the neighborhood of 100 cu.ft. for reasons which Professor Bailey seems to have put a finger on. One exception that comes to mind is the locally remodeled Minerals Separation lead roughers at Consolidated Mining & Smelting, which were enlarged to 136 cu.ft. per cell. There, be it noted, the grind is 87 percent minus-200 mesh and the ratio of concentration is only 2½ to 1, leaving no coarse gangue to hold in suspension. But if tailing size there were to run up to 3 percent on 35 mesh, which is the average at International Nickel (and heavy norite at that), the prediction is reasonably safe that the cubes would defeat the squares.

I must confess to remissness in my February article in not clearly distinguishing between machine size and machine capacity, though it was size that I had in mind. The two are by no means the same thing. Let a faster collector reagent be discovered, or an activator that renders the value mineral less coy; let the chemical environment be so improved that a desired mineral grain once attached to a bubble stays attached; let the art of grinding be so improved that fewer mixed grains are present or wee micron production is minimized, and flotation machines may actually be made smaller while their capacity increases.

All in all, the editors of *E.&M.J.* were magnificently right in the conclusion of their editorial: "What is needed is an entirely new approach, one that will use all the new scientific and industrial tools of the present, not alone the cut-and-try tools of the past."

True, indeed! When do we start?

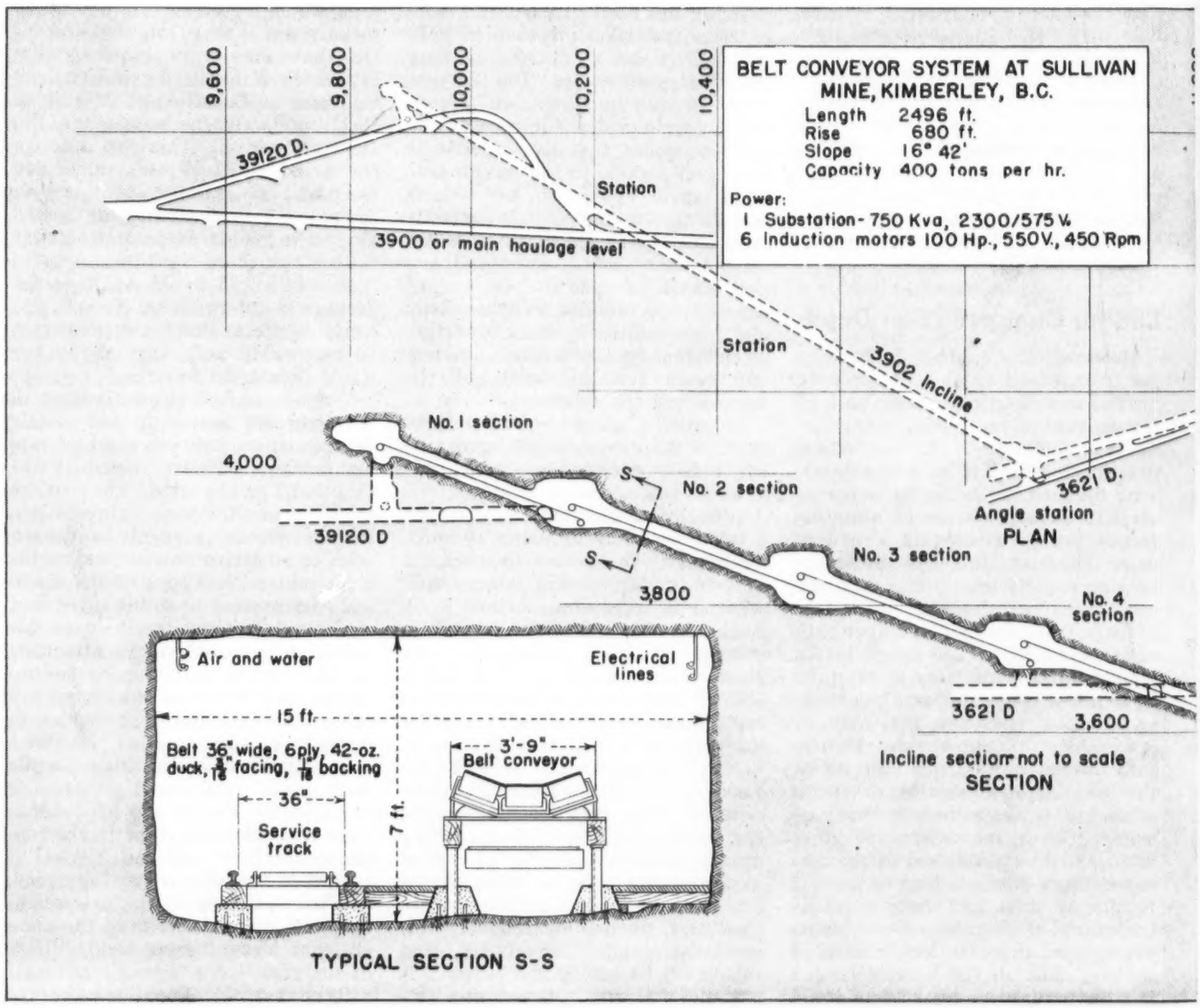
Underground Belt Conveyor Handles Increased Tonnage

JOHN B. HUTTL, Associate Editor

WHEN IT BECAME APPARENT that one section of the orebody below the 3,900-ft. level of the Sullivan mine of the Consolidated Mining & Smelting Company of Canada, Ltd., at Kimberley, B. C., would produce ore in excess of the capacity of the old shaft serving that section, management was faced with the problem of choosing between the sinking of a new vertical shaft from the surface to intersect the orebody below the 3,350-ft. level, and the installation of a belt conveyor to handle the increased production.

Factors which influenced the selection of the belt conveyor were: (1) The cost of the conveyor installation was estimated to be about half the cost of sinking and equipping a shaft of equivalent capacity; (2) lower operating costs; (3) horsepower requirements for the proposed shaft were estimated at 1,800 hp. at peak load, in contrast to 480 hp. for the conveyor; (4) flexibility, as additional depth could be reached by extending the conveyor system, and (5) the conveyor system would fit in with the existing transportation facilities at both loading and discharge ends, and provide an 8,000-ton storage pocket at the top.

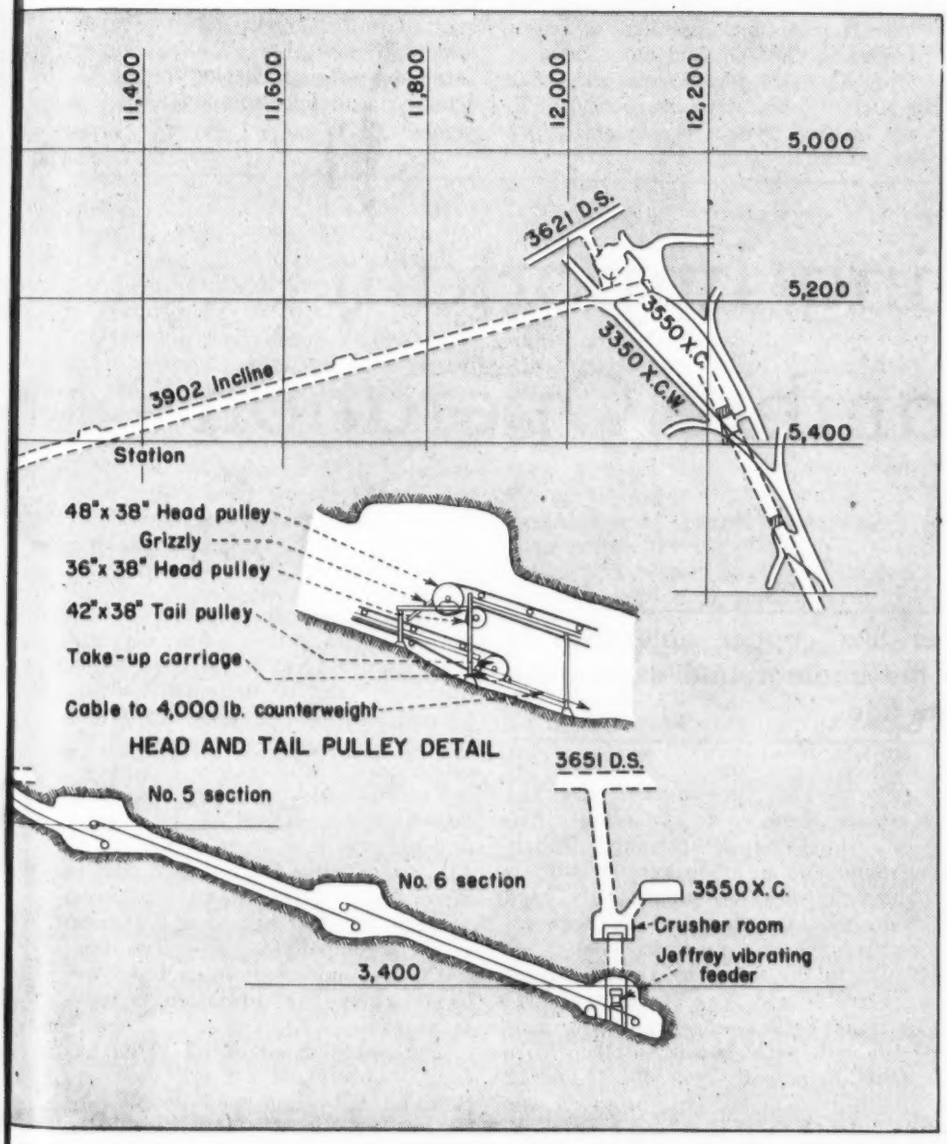
This section served by the conveyor had been developed to the



3,350-ft. level by an inclined shaft, with levels at 3,800, 3,650, 3,500, and 3,350 ft. Prior to the installation of the belt conveyor, ore mined in the area was crushed to 8 in. in a 36x48-in. Allis-Chalmers jaw crusher erected in a chamber between the 3,350- and 3,500-ft. levels and connected to the levels above by a system of transfer raises. The crushed product dropped into a transfer raise capable of holding 1,100 tons, whence it was transported on the 3,350-ft. level by 6-ton cars to a 1,300-ton shaft pocket. From here the ore was hoisted up the 39-deg. shaft to the 3,900 or main haulage level. The inclined shaft was equipped with a 500-hp. Vulcan hoist and two 8-ton skips, and had a maximum capacity of about 3,000 tons per day. Production of the section was expected to increase to about 50 percent of the total 8,000-ton mine output.

The arrangement and equipment of the conveyor installation as shown in the accompanying plan and section are a crystallization of several months of study, investigation, and planning under the direction of R. H. Stewart, consulting engineer for the company, following the opening and development of the Sullivan orebody below the main haulage level, known as the 3,900-ft. level.

Dimensions and pertinent information pertaining to the installation are included in the accompanying drawing. It should be noted that the conveyor incline is not driven in a straight line but contains an angle station on the 3,650-ft. level, between the third and fourth belt section, which changes the direction through 45½ deg. This was required to place the incline below the footwall and near established levels to permit simultaneous advancement from several points. The incline was driven from four points, with the longest single section measuring 901 ft. All work was carried out on two shifts, with three men on each shift. The standard V-cut round of from 18 to 24 holes was drilled with two 3½-in. drifters mounted on vertical bars. Broken material at the face was removed by a 48-in. scraper and a 6x8-in. air hoist. Two scrapers and two hoists were used when the haulage distance exceeded 500 ft.



Cost of Development

The vertical drop of 8 ft. provided at the transfer stations to permit the installation of a grizzly was increased to 13 ft. at the angle station. This was accomplished by changing the slope to zero for a distance of 30 ft. when the face of the raise reached one of the transfer stations, and then increasing it to 16¾ deg. and continuing the raise on the line for the next station. The stations were cut after completion of the incline by taking down the back to a height of 22 ft. and cutting a room 24 ft. long and 15 ft. high on the right side to accommodate the belt motor and switch panels. The 8x14-ft. drift driven at the top of No. 4 conveyor section for a distance of 50 ft. past the center of the head pulley houses a hoist and a transformer station. Auxiliary development work required for driving the conveyor incline totaled 1,252 ft. of drifting and raising. Total cost of driving the incline, including the auxiliary development and cutting of stations, was $29.60 (Canadian) per foot.

The conveyor sections and 3-ft. gage service track are installed in the incline as shown in the section. The conveyor deck is made of 2x10-in. tongue-and-groove plank nailed to 6x8-in. stringers which are supported on angle-iron legs with concrete footings at 15-ft. centers. The service track consists of 35-lb. rails placed on 6x8-in. stringers supported on concrete footings spaced 7½ ft. Hoisting and skip transfer equipment includes two hoists, one at the top of No. 1 conveyor section and the other at the angle station, and a Y-rail arrangement to facilitate transfer of the skip from one track to the other. All timber was creosoted.

The 36-in. belt used on the six sections runs on Link-Belt Type 40 troughing idlers installed at 5-ft. centers. Every tenth unit is a Type 62 self-aligning idler. Return idlers are Type 41 units, spaced 15 ft., and every third or fourth unit is a Type 85 self-aligning idler. Three impact idlers support the belt under each loading point.

The 48x38-in. rubber-covered head

pulleys revolve at 32 r.p.m., and have ¼x⅛-in. grooves for removal of water. About 4 ft. 3 in. behind, and 2 ft. 6 in. below each head pulley, is a 36-in. diameter by 38 in. rubber-slatted snub pulley, with a Stephens-Adamson spring wiper between the head pulley and the snub pulley. Each of the 42x38-in. tail pulleys is supported on a take-up carriage operating on two 40-lb. rails, spaced 4 ft. 3 in. Required tension in the belt is provided by a counterweight at the side of the incline, and connected to the carriage by a block-and-cable arrangement. The carriage has a travel distance of about 8 ft.

Power for each belt section is furnished by a 100-hp., 550-v., 450 r.p.m. squirrel-cage induction motor, with double speed reduction to 32 r.p.m. on the head pulley shaft by means of Renolds chain drives in oil-tight chain cases. Electric power is supplied by a 750-kva., 2,300/575-v. substation installed at the angle station. The head shaft of each conveyor belt is equipped with a 30-in. differential hand brake to prevent a run back of the loaded belt.

The six motors are started by one master control button through a reduced voltage, automatic starter, completely interlocked so that each motor must start in proper sequence and get up to speed before the next section commences operation. All sections are interlocked electrically so that power failure on any motor will automatically shut down the entire system. Additional control equipment includes a speed switch on the tail pulley of each belt section and connected to the motor of the section below. This unit provides a mechanical-electrical interlock, which, in the event of mechanical failure of any section, shuts down the motors of all sections below, thereby stopping the flow of material to the faulty section.

Ore crushed in a jaw crusher and stored in the transfer raise is withdrawn from the raise through a concrete chute with a 3½x3-ft. opening and manganese steel lining. It has a slope of 35 deg. and is equipped with a drop door operated by compressed air. From the chute, the ore drops by gravity onto a 36x96-in. Jeffrey vibrating feeder installed at right angles to the belt and on a slope of from 30 to 40 deg. discharging over a 4-ft. 9½-in. manganese-steel grizzly, spaced 3 in. It consists of 11 1x6-in. bars 4 ft. 9¼ in. long. A strip of rubber 7½ in. wide and 36 in. long is bolted at the top of the grizzly to come in contact with the belt. A similar grizzly is installed at each transfer station. Tramp steel is prevented from dropping onto the belt by a 5-kw., 55-in. circular magnet installed above the discharge end of the vibrating feeder.

The rate of feed from the open chute gate to the belt is regulated by controlling the current to the vibrating feeder. By watching the current to the motor of the No. 6 or lowest section, and adjusting the feed to keep this current at a safe margin below the maximum for the motor, a correct rate of feed can be maintained at all times.

The capacity of the conveyor installation is 400 ton per hour. Operating personnel consists of one operator and a helper. Protection against fire will be afforded by a sprinkler system to be installed shortly. Construction of the conveyor system was started in December 1943 under the supervision of G. H. McKay, superintendent of construction and maintenance, and was completed in November 1944.

Core Drilling Important In Matahambre Operation

P. R. HILL, formerly Diamond Drill Supervisor, Minas de Matahambre, S.A., Matahambre, Cuba

The continued production of this copper enterprise in western Cuba is credited to the underground exploration campaign initiated some years ago

FOR TWENTY YEARS the use of diamond drills in the exploration and development program of Minas de Matahambre, in Pinar del Rio, Cuba, has played a vital part in tracing known veins of copper ore to their limits and in discovering new ones. The country rock of the area, according to a report by E. N. Pennebaker on the geology, consists of shale and sandstone with all degrees of gradation and interbedding. The sandstones are medium-grained to fine-grained, and where exposed are properly termed "graywacke." On the surface these rocks are readily disintegrated by weathering. Underground and in steep arroyo bottoms the graywacke is surprisingly hard and resistant and has the general appearance of a quartzitic rock.

Up to the time the United States entered World War II, an extensive surface drilling program was carried out with gasoline-driven core drills, principally Nos. 40, 22 and 12 of Sullivan make. This program was abandoned in 1942 to conserve gasoline, tires and hose. The No. 12 drill, however, was converted to air and, with several No. 6 Sullivan drills, has been used to important advantage in opening new territory, which has served to prolong the life of the mine.

Records show that in 1941 over 59,000 ft. was drilled on the surface and underground at a cost of $1.18 per foot. Owing to increased cost of labor and supplies, the present average cost per foot is higher, as shown in the accompanying table. The drilling today, moreover, is on the lower levels where the formation is more fractured.

The swivel head of all drills has been standardized for EX rods and Sullivan EX rigid-head double-tube barrels are used. Because of the

depth of the mine, approximately 95 percent of the holes are drilled horizontally.

Difficulties Overcome

In the past difficulty was had from excessive wear on the core barrels and the upper rim of the reamer shells. This was owing partly to the abrasive nature of the formation and partly to the large amount of horizontal drilling which causes more wear than does drilling at other angles. Naturally, this resulted in more fishing jobs and to eliminate it various experiments were made.

First, scrapped carbon was set on the rims of the core shells, sometimes augmented by No. 2 Haystellite. More recently a ring of half-inch Stellite was applied by electric welding onto the new core shell above, and before the reamer stones were set. Great care must be exercised not to injure the thread and not to burn completely through the shell, as it is relatively thin at this point. This procedure was watched closely to ascertain if it would weaken the thread screwing onto the core barrel, but so far no breakage has occurred.

Owing to the war, material and supplies were scarce and arrival of shipments was uncertain. To overcome these difficulties various practices were devised. One of these was as follows:

Thin and used, double core barrels were reconditioned and used again at small expense by the following procedure: First, 6 in. was cut off of each end of the old barrels. Then, with the old core-barrel head, they were built up by arc welding for a distance of about 5 in. on each end and also at the head of the barrel. Next, the piece was machined in the machine shop to the original size of the barrel when new and the new threads were cut for the reamer shell, the same old head being used after it had been rebuilt. The original inner tube was used simply by cutting off the bottom end to the desired length and drilling the same holes for return water.

These reconditioned barrels drill from 300 to 400 ft. before having to be repaired again. Although they are much smaller along the center, no breakage has taken place in three years of testing and observation. Core recovery has been practically the same as with new core barrels.

Many worn-out swivels have been repaired by making new bushings and parts.

Drill hose is immediately spliced with pipe and suction hose is used until there is very little remaining of the original 10-ft. length.

Chuck jaws are annealed and then re-sharpened in a milling machine and afterwards case-hardened.

Replacements have been held to a minimum, at the same time that the machines have been kept running at a fairly constant pace.

Sludge samples are taken in ore but are seldom used as the core recovery in the massive chalcopyrite is very good in most cases. The holes are numbered consecutively and are logged and recorded by the engineering department. Daily drill reports are kept, as well as daily bit reports. At the end of each shift, all cores and samples are brought to the surface in small core boxes and transferred to larger ones in which they are kept until properly recorded in the permanent record of holes drilled.

The rod grease, or "dope," is prepared on the job. It consists, roughly, of the following ingredients, and is mixed in a half-end of an oil drum: Approximately 150 lb. of ordinary axle grease, 30 lb. of crater compound, or cable oil, boiled or heated together, and 10 lb. of resin. The last is heated in a separate pail and poured into the grease, while stirring very thoroughly. Primarily this dope is applied to the drill rods to keep them from vibrating and insure the smooth operation of the drill. It also reduces wear on the core barrel and drill rods, tends to prevent small caves and seals off small crevices.

Each drill is operated by a crew consisting of a driller and a helper, locally trained, who work in conjunction with the development of the mine. One *capataz*, or foreman, is used to keep supplies and repairs going to the drills, and to assist in changing locations. In all, nine drill crews are employed at present.

Cast-set bortz bits are used until hard, fractured ground is encountered. Then the pre-cast bits are taken off and replaced with hand-set carbon bits. Six carbons of good grade are used for clearance stones and 10 to 12 smaller stones in between to give more cutting edge and to prevent excessive wear on the metal, as the graywacke is very abrasive.

Straight-wall bits are employed, as the dry blocking method has proved more satisfactory than using core lifters. This also eliminated the danger of running over broken pieces of core lifters. The carbon bits and reamer shells, when re-setting is necessary, are sawed off and burned out with nitric acid.

The pre-cast bits, which are set in a carbide steel matrix, are returned to the manufacturer, each having a small salvage value. However, it has been found profitable to use the stones until they will not penetrate the rock. Many carbon dealers advise running until they are only 50 percent used up.

The carbon bits are cut up at the end of each month and are weighed by the accounting department, so that the records may be kept up to date and a true value of the stones on hand be known by the management at all times.

Minas de Matahambre, S.A., has produced copper ore for over thirty years, is producing at the present time, and thanks to its success with core drilling, has reserves which will carry production some years into the future.

Core Drilling Data, Minas de Matahambre

Year	Feet Drilled	Cost per Foot (Underground) — Labor	Supplies	Pre-set Bits and Cartons	Power	Total	Per Shift — Advance Feet	Cost
1940	34,876	$0.635	$0.255	$0.356	$0.137	$1.383	15.8	$21.79
1941	33,770	0.635	0.232	0.369	0.219	1.455	14.8	21.58
1942	31,126	0.645	0.109	0.240	0.290	1.284	13.4	17.24
1943	28,358	0.590	0.184	0.491	0.265	1.530	14.5	22.20
1944	13,382	0.932	0.127	0.401	0.699	2.159	12.6	27.43

Drilling cost above is for underground work, using compressed air machines. The surface drilling has not been included since those machines were gasoline driven and other conditions, such as surface rock, etc., make comparison difficult.

Aerial Photographs Speed Reconnaissance Work

JOHN EDWIN, Mining Engineer, Las Vegas, N. M.

Advantages are quickly realized in the tropics where the relief is low and the country swampy and covered with dense vegetation

WHEN WE SPEAK of using aërial photos in geological work we ordinarily think of applying every technique known to the science of photogrammetry. Sight may be lost of the assistance that can be obtained from the use of the simplest elements of the science as an aid in reconnaissance. If only an elemental study of the relief, topography, drainage or any other physiographic features will be of assistance in a field program of exploration, a fully detailed photogrammetric examination is not in order and may even be a waste of time. Rectification, building mosaics, and plotting of accurate maps are not necessary at this stage. The chief necessities at this time are usually the furnishing of reliable data on the items listed and accurate geography. Detailed layouts may follow later, should the intricacy of the problem justify or should the reconnaissance be followed by further detailed examination and development.

Securing and using aërial photos while reconnoitering may seem to entail needless delay and expense at this stage of an investigation. The desirability thereof can be determined only by considering the immediate problem. But if the work is to be done, as is often the case, in a remote region which has not been adequately mapped, it may result not only in bringing success to the project but in actually paying immediate dividends in saving time for the field party. This was well illustrated on a recent tropical expedition.

The area visited was covered by typical dense jungle vegetation and in most instances objectives were reached only after traversing miles of deep swamps. Outline maps of the region were often so erroneous as to be worse than useless. Most parts were all but uninhabited, so that native guides were unobtainable or useless for the purpose required. An added difficulty in some sections was excessive magnetic disturbance, with the result that compass surveys were entirely inaccurate in these areas. About the only preliminary clues used in the problem at hand were topography and relief. The general method of working was to reach some eminence and try to find points on it from which observations could be made. Seldom could fairly clear views be obtained and then only after delays for cutting timber and climbing trees. But even with the clearest of views it was often difficult to judge the type of topography and other features of interest. When observation points could not be located that would assist in directing the work, random lines cut through the jungle were the only alternative. Such a program is tedious, and in many instances a party will fail to reach the objectives sought.

Stereo Pairs Aid Studies

Aërial photos had been taken for other purposes in this area. It was found that in one section at least, these covered a part of the territory being explored. Permission was obtained to study them and to make outline tracings from them. The field work would have been further facilitated had it been possible to take stereo pairs into the field and to continue to study these under the stereoscope. Certain details cannot be traced or may be missed at the time of making the tracing. If stereo pairs are available to be studied alongside the field work, features can be checked from one to the other.

Once stereoscopic vision is developed, the engineer or geologist in the field can interpret the features of interest to him as well as a highly skilled photogrammetrist. The geography, of course, needs no interpretation. If enough extra photo positives are not at hand, copies to be used in the field must be made by making tracings from the photographs. In most instances these are superior to photographs for field work. The work of tracing can be done at any point where simple drafting equipment can be had. A glass-topped table is always of assistance if lighting is available. If a set of photographs can be taken to the field camp, additional data may be transferred to the tracings there, even though they were originally prepared at a base. Apparently irrelevant items may be omitted which later prove of interest.

Little, if any, evidence of relief is apparent on a single photograph. As relief can be seen only in stereo pairs under the stereoscope, the quadrangular tracings should be made under the stereoscope. Though the actual amount of the relief cannot be calculated accurately without other apparatus, it can be judged well enough, with a little practice, to suffice for reconnoitering. During the investigation mentioned, the quadrangle tracings were made on a tough, waterproof tracing paper. A regional map was composited from these. The results are not an accurate topographic map (which would take far more time and require equipment that would not be available to a reconnaissance party) but a sketch which fulfills all geographic requirements and, in addition, shows the features which constitute the prime objectives of the investigation.

The only step that has to be taken in the field to prepare the quadrangular map or photo for use is to secure orientation. In remote areas where there is no sort of preliminary survey control, a bearing taken between any two points visible in the field and on the photograph will serve to orient it. In the area mentioned, one or more streams always crossed each quadrangle and a prominent tangent on one of these would be se-

A VIEW taken along the lower Orinoco in Venezuela. Much information can be obtained by studying stereo pairs under the stereoscope.

lected. A compass bearing along this tangent will give the orientation (the compass dial having been adjusted for declination). Inasmuch as there were areas of magnetic attraction in the general region, the precaution was always taken to check by observing the bearing of at least two stream tangents. A zero azimuth can then be laid off from each observation and, if these check within close limits, the orientation is considered satisfactory. If magnetic attraction is prevalent over an entire quadrangle, other means of determining direction must be used.

The scale of the photographs is determined by the usual formula: $S = \frac{f}{H}$, where S is the scale (usually expressed as a fraction with the numerator 1); f is the principal distance of the camera, and H is the height of the camera above the datum plane. Except under unusual conditions, the altitude of the flight will remain sufficiently constant that the slight variations in the scale of the photos from a single flight are of no consequence. Even without adjustments and corrections, measurements taken from the photographs will be more accurate than the field distances taken on a reconnaissance survey.

A field party, aided by a stereoscopic study of aërial photographs of an area, can definitely lay out and work toward any feasible-looking objectives. Only after traversing unknown terrain can one appreciate the seeming futility of doing such work unguided. There may either be the question whether a given line should be carried further or whether it should have been driven at all. Protracted periods may be spent in work that seems all but useless. Discouragement to all parties concerned is likely to be one result. Conversely, if photos are at hand, all data can be correlated to the best advantage, whether the results be actual discoveries or merely relevant geologic and physiographic data.

Factors to Be Considered

A decision in regard to taking aërial photographs will depend on a number of factors. Aside from the comparative cost and the question of their usefulness to the problem in hand, the principal factors are permission to take photographs and the proximity of landing fields. Some foreign governments may be loath to grant such permission. If they do, some may require that a set of positives, or even the negatives, be turned over to them. Unless a rival party is investigating the same region for the same resources, this should cause no serious concern.

The problem of landing fields will become less and less difficult and may be all but eliminated in the future by the helicopter. Amphibians may solve the problem where sufficiently large bodies of water occur. Information on flying conditions is now generally available, so that such factors can be checked in advance. In peacetime, commercial aërial photographers should be able to furnish information on the greater portion of the globe.

Some foreign countries have already begun aërial surveys. Parts of the United States had been mapped prior to the war, but in piecemeal fashion and by various Government departments, each for its own specific purposes. How much has been done by the military during the war will not be known until they release the story. It would seem that no better work project could be undertaken by the Western mining states than a thoroughgoing aërial survey. Where such aërial surveys are made, copies of the photographs should be made available at cost to interested parties. Such a program would stimulate exploration in these regions.

The ultimate effect of the airplane and the aërial camera on exploration remains to be seen. Accomplishments to date prove that actual discoveries can be made, either directly or indirectly, and that helpful information can be obtained with their assistance. As soon as equipment is released by the military, these aids should take their place alongside the many other techniques now available in the search for new mineral deposits, especially during the reconnaissance stage.

Non-Ferrous Metallurgy in Wartime Germany

Little evidence has been found of recent research and development, aside from the light metals. Very high recoveries of all values characterized the practice, with little regard for labor cost and that of reagents.

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SPONSORED BY THE TECHNICAL INDUSTRIAL INTELLIGENCE COMMITTEE of the combined Chiefs of Staff, I spent two months in Germany in 1945 for the purpose of investigating any new or unusual metallurgical practices that might be of advantage to the Allies in pursuing the war with Japan. In brief, I can say that I uncovered practically no recent research or development work on non-ferrous smelting and refining (excluding light metals) in that country. The procedures used in smelting and refining copper, lead, zinc, and even tin appeared for the most part to be entirely conventional and therefore do not merit a description other than for purposes of record. However, one or two metallurgical processes that were in current use there have not been adequately described in the past and a brief outline of them is justified at this time.

Recovering Copper and Tin From Scrap

The process for recovering copper and tin from brass and bronze was, of course, important during the war, due to the pressing need for tin and the decidedly less pressing need for copper. Contrary to the usual impression, it is my opinion that aluminum was far more critical than copper in Germany during the war and that the copper position, though not comfortable, was still not very critical. This opinion is based on the surprisingly large stock of copper found in the yards of most producers and may be a false impression brought about by the complete breakdown of Germany's transportation facilities just before the surrender. It was also noted that during the war very little aluminum was used in Germany for conductivity purposes.

Undoubtedly the most important plant for treatment of copper-base scrap for recovery of its component metals was Zinnwerke Wilhelmsburg, and the procedure used there was in general followed at other plants. The scrap was charged to small horizontal 5-ton converters, where it was melted and blown, effecting the removal of zinc, lead, and tin to the fume and obtaining a blister, or in some operations an anode copper.

Initially, 17 percent of coke was charged to the converter and the blast of air through the hot coke supplied the heat for melting the charge of brass, which was dumped on top of the coke. As the charge melted, the blowing was continued, causing the complete elimination of the zinc and tin and most of the lead from the metal. However, from 25 to 35 percent of the metal charged formed an oxide slag, which was skimmed from the converter and subsequently smelted in a cupola to metal, which was returned to the converter. This slag was relatively poor in zinc and rich in tin compared to the ratio of these metals in the charge. However, as the metal from this skim was returned to the converter, the tin built up in the charge to a point where its elimination to the fume just equaled its intake in new metal to the cycle. Consequently, the tin and zinc contents of the dust, which was caught in a baghouse, were approximately equal to the tin and zinc contents of the new metal charged. Some lead always remained in the metal in the converter and was recovered from the electrolytic tank-house slimes in the usual manner by cupellation.

Converter Life Short

As a general rule, converter practice involved about four 5-ton cycles per day. However, the converter life was not very good, and it was necessary to remove the shell from the production line after 50 to 150 cycles of operation. This was due to the fact that an accretion built up within the converter rather rapidly, limiting the amount of metal that the converter held and eventually the amount of heat that could be generated in the cycle. This necessitated cooling the converter down, pulling off the end plate, removing the accretion manually, and repairing the lining before putting the converter back into service. In some instances the lining had to be completely replaced. Most plants averaged two converter shells for each blowing stand, one shell being relined while the other was in use. This procedure was probably economically sound in Germany, where labor was cheap, but economic balances functioned even less in Germany during the war than they did in the United States, and the assumption expressed in the foregoing may be false.

Solder From Flue Dust

The handling of the baghouse dust differed from plant to plant, depending on the facilities available. At Nord Deutsche Affinerie, which did not have a satisfactory zinc outlet, only low-zinc bronzes were processed. The flue dust was smelted to a solder, either in a small cupola or in a small reverberatory furnace. The solder was marketed as such after suitable kettle refining. In this plant the operating company claimed a 90 percent recovery of tin.

At Zinnwerke Wilhelmsburg the dust went either to special coal-fired reverberatories or to a new rotary furnace likewise fired with pulverized coal. As a general rule, 15 percent of anthracite, 6 to 7 percent of soda ash, and 1½ percent of fluorspar were added to the charge. In the smelting process the zinc was largely volatilized to special baghouses and the tin and lead were recovered in the form of a crude solder. The batch charged to the reverberatory was 5 tons and each furnace would smelt 13 tons per day.

New Furnace Smelts More

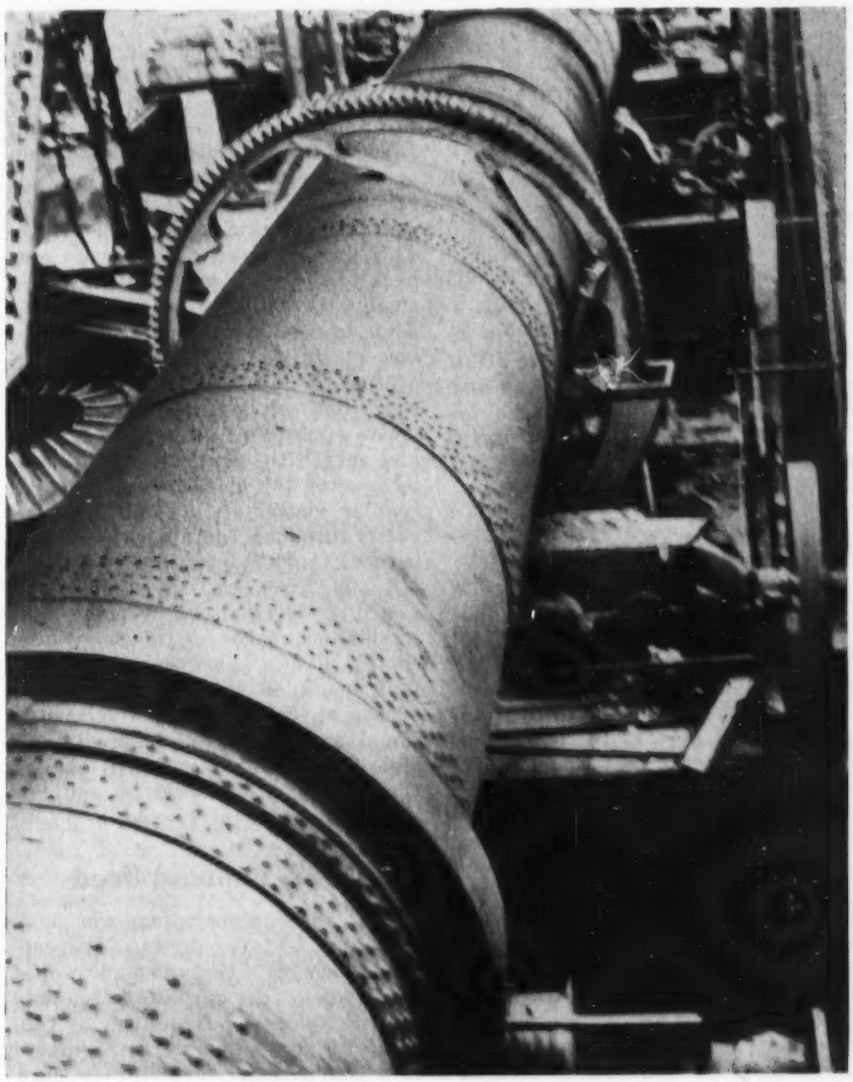
The batch charged to the newer rotary furnace was 3 tons, but this furnace smelted 20 tons per day. The zinc oxide produced from the rotary furnace was whiter and lower in tin than that produced from the reverberatory furnace. In this plant if the zinc oxide contained over 2½ percent tin it was usually reprocessed before selling it to the pigment industry. The lead-tin alloy produced from either furnace was refined by blowing with air to remove zinc and liquating to remove most of the copper and iron, which were completely removed with sulphur. Aluminum was then used to remove arsenic and the aluminum skims were burned immediately to prevent the accidental generation of arsine upon contact with water. In this plant, it was claimed, the over-all recovery of tin was about 85 percent and of lead 80 percent. The copper recovery was assumed to be 100 percent and the zinc recovery was not known.

At Metallhütte Kall the baghouse dust containing tin was shipped to Berzelius Metallhütte Gesellschaft. At Kall the company claimed that its tin losses amounted to roughly 1½ units and were independent of the tin content. At Berzelius no brass and bronze scrap were treated, but the company did have a source of mixed lead, tin, and zinc oxides from its own tin plant as well as that from Kall and possibly others. These oxides were charged to a Waelz kiln, in which the zinc was fumed off and a lead-tin metal tapped from the kiln. In this plant the zinc oxide fume ran less than ½ percent tin and lead and was handled directly in its own zinc retort plant. The tin-lead alloy was held in the kiln for periodic tapping by means of a retaining ring. It contained practically all the metal impurities in the charge and was refined by liquating away the iron, copper, and arsenic and removing zinc by means of oxidation. The alloy that was obtained in this manner was used for blending in regular solder production.

Handling Byproducts at Berzeilus Tin Plant

The tin plant at Berzelius was in many respects conventional, but its method of handling byproducts was most interesting. As a general rule, all tin ores were charged to their regular blast furnaces, from which metal and a slag running 2 to 3 percent tin were tapped. This slag was resmelted in a hot-top blast furnace, from which most of the tin, zinc, and lead was volatilized. From this furnace a speiss-like metal and a throwaway slag were tapped. The metal was rich in iron, copper, and antimony if present in the charge and contained only a fraction of the tin and lead charged. It was charged to very small converters holding only 1,200 kg. and was blown to a blister. The fume obtained from the converter as well as from both blast furnaces was sent to the Waelz kiln, the operation of which has already been described. Waste-heat boilers were used to cool the gases from both the hot-top blast furnace and the converter.

When the charge handled produced a very impure tin it was refined by electrolyzing. The process used could handle anodes as low as 76 percent in tin. The electrolyte was sodium sulphite with 60 grams of sulphur per liter. The solution was held in iron tanks and heated with steam coils to a temperature of 80 to 85 deg. C. Oil was used on the surface of the electrolyte to control evaporation. Zinc and iron were the only elements that interfered with the electrolysis and there was no difficulty keeping these below safe limits. The usual impurities, copper, antimony, arsenic, and lead, did not cause any trouble and there was no difficulty in produc-



A Waelz kiln in a German metallurgical plant.

ing tin as pure as 99.98 percent. However, the process was quite expensive and was used only where tin of marketable grade could not be produced by kettle refining processes or by blending.

Lead Smelting Practice Ordinary

Lead smelting and refining practice in most parts of Germany was entirely conventional, usually on a rather small scale and occasionally archaic. However, there did not seem to be any shortage of lead for necessary military uses. I was astonished to find several hundred tons of American lead in the plant of one lead fabricator where it had remained in stock throughout the war.

Perhaps the most interesting lead-smelting operation in Germany was that conducted at the Bleikupferhütte, located at Oker, in the Harz Mountains. The operation is interesting because of the grade of the concentrate smelted, which was received from the Rammelsberg mines and had the following percent assay:

	%		%
Lead	30	BaO	3–5
Copper	3–4	Arsenic	0.03
Zinc	18–20	Antimony	0.10
Silica	1–3	Cadmium	0.05
Lime	1	Tin	0.001
Fe_2O_3	15	Silver, grams	500
		Gold, grams	2%

The plant received 50,000 tons of this concentrate per year and, in addition, also smelted a roasted and leached pyrite cinder produced locally, and also the cinder of a pyrite containing values which was roasted for the company's own acid plant.

Rotary Sintering Machines

The charge to the sintering machine contained in addition to that given, silica and 50 percent returned fines. Its sulphur content was 12 percent. The operation was once-over, and the sinter produced contained 3 to 4 percent S. This high-sulphur content was permissible to balance the high copper on the charge. Rotary sintering machines 8 meters in diameter were used, making one revolution per hour and sintering 150 tons of charge per day. The charge to the blast furnace ran 50 percent sinter, 25 percent return lump slag, and the remainder skims, drosses, cleanings, and byproducts. This made a charge containing 1 to 2 percent S, and the operation uses 8 to 9 percent Ruhr coke. The blast furnaces were 105 cm. wide by 500 cm. long, and 7 meters high to the bottom of the bell. The company smelted 250 tons of gross charge per day. The furnace campaigns lasted nine to ten months and naturally terminated due to accretions. Lead was tapped from the furnaces every 2 hours and slag and matte every 15 minutes. Matte was separated from the slag in the forehearth. Fifteen tons of matte was produced per furnace-day, and 30 to 35 tons of lead. The slag was kept in lump form, as most of it was sent to a fuming furnace in the adjacent Zink Oxyd Hütte for zinc and lead recovery. A typical analysis of the slag was:

	%		%
Lead	2	Silicon	20–22
Copper	0.8	BaO	3
Zinc	16–18	Lime	8
Iron	32–35	Silver, grams	15
		Sulphur	3–3.5%

The matte ran 18 to 20 percent Pb, 33 to 35 percent Cu, 8 to 10 percent Zn, 12 to 15 percent Fe, and 20 percent S.

Matte was charged cold to one of two 6- to 7-ton horizontal converters, where it was blown in the usual way to eliminate impurities, silica being added to make a fluid slag, which ran about 16 percent Pb and 10 percent Zn. Ninety percent of the lead and most of the zinc entered the fume. The first converter slag was sent back to the lead blast furnace, but a small part of the second slag was set aside to use against a portion of the new matte in a special smelting operation in a rotary furnace. This operation produced a high-grade matte containing 60 percent copper and very little zinc, which was used to sweeten the matte charged to the regular converters. The main converter product contained 96 to 97 percent Cu, 1 percent Pb, ½ percent Ni, and 2,000 gm. silver, and was cast directly from the converter into small anode molds for the electrolytic copper plant. The operation of the tank house, in spite of the analysis of the anodes, was strictly conventional, and this was undoubtedly possible due to the very small size of the anodes, wide spacing, and low current densities employed.

Batch Refining Used

Lead refining operations were conducted in 60-ton batches. The copper, which ran 1½ percent, was first removed by dry drossing followed up with sulphur. The antimony content (1.5 percent) was then removed in a conventional softening furnace, producing a slag running 20 to 22 percent Sb, 1 percent As, 65 percent Pb, and 80 to 100 gm. doré. The softened lead was then desilverized, using the Parkes process, and the zinc remaining in the lead was removed with caustic, which also cleaned the metal for casting. Lead containing 0.04 to 0.07 percent Bi was marketed as such or debismuthized to 0.02 percent Bi lead for storage-battery makers. The company debismuthized with the calcium and magnesium process, but claimed, quite correctly, that its plant was not properly equipped for this process and that it had not evolved a satisfactory commercial procedure.

Furnace Rotary Type Also

The Bleikupferhütte plant was interesting, not only because of the grade of concentrates handled but also because of the use of rotary furnaces, called "kurztrommelofen," as already mentioned. One such furnace was used to smelt slag-matte combinations; another to smelt softener slags to produce antimonial lead. The furnace for this latter purpose was lined with alumina brick, and it was said that the linings lasted from one to three years. In another rotary furnace, copper drosses from the lead refinery were smelted with arsenic skims to produce a shipping copper speiss and a crude lead. In addition, all copper tank-house slimes were handled in a rotary furnace and, in fact, practically all byproduct furnace operations were conducted in these rotary furnaces and their use was enthusiastically indorsed by the plant manager. The furnaces as used at Bleikupferhütte were 3 meters in diameter by 3 meters long. They rotated about their horizontal axis only, usually at the rate of 1 r.p.m. They were fired with pulverized brown coal at one end, and had a reasonably tight flue connection at the other end. As a general rule, a waste-heat boiler was used to cool the gases from each unit before conducting them to either a baghouse or a Cottrell.

The Nord Deutsche Refinery

At the Nord Deutsche Affinerie the lead smelter was strictly conventional, operating during the war on high-grade Yugoslavia flotation concentrates averaging 80 percent Pb, 15 percent S, 0.2 to 0.3 percent Cu, 0.6 percent As, 0.5 percent Zn, 0.1 to 0.2 percent Bi, 1,050 gm. Ag, and 0.3 gm. Au. In the refinery the Harris process was used on 60-ton batches producing the usual by-

products of sodium antimonate used by vitreous enamelers and calcium arsenate sold to insecticide makers. After desilverizing by the Parkes process, the zinc was removed with caustic and the precipitated oxide shipped to zinc smelters.

As a general rule the lead produced was debismuthized with calcium and magnesium down to 0.01 percent Bi. The bismuth drosses so produced were smelted to metal and blended with any other lead available running more than 1 percent Bi to make anodes for the Betts plant. The slimes from the latter plant running 97 to 98 percent Bi were smelted and cast into small anodes for the electrolytic bismuth plant. This plant operated with an electrolyte containing 100 gm. of common salt per liter and 60 gm. of bismuth. Current density employed was 100 amp./sq. meter and oil was used on the surface of the electrolyte to prevent spray. Silver starting sheets were used as cathodes and the deposit was removed twice monthly. The bismuth produced was melted and sold for drug uses without further refining. This plant likewise handled the bismuth drosses from the Frederik August Hütte of the Metallwerke Unterwesser, which likewise debismuthized its lead. The lead smelting and refining operations of this plant were studied and found to be entirely conventional and for the most part behind current practice in America.

The same may be said for the practice at the Binsfeldhammer smelter of the Stolberger Zinc A.G. für Bergbau und Hüttenbetrieb. The Bleihütte Clausthal was a lead smelter chiefly notable for the fact that it had been in operation for 550 years, and at Mecherniche the Gewerkschaft Mechernicher Werke was notable because there were two round blast furnaces that looked as though they might have been 550 years old. The Waelz kiln operations of this plant to concentrate low-grade lead oxide ores have been described elsewhere. However, the war developed an interesting sideline mining operation recovering nickel and cobalt from the mine waters. When these waters built up to 1 percent nickel and 1 percent cobalt they were shipped to Kupferhütte at Duisburg.

Zinc Industry Found in Good Condition

As was to be expected, the zinc industry in Germany was found to be in better condition than any of the other non-ferrous metal industries. The electrolytic zinc plant in Silesia was not visited, but it was rumored to be in full operation throughout the war. The very fine electrolytic zinc plant at Magdeburg, though bombed in 1944, still produced metal at a decreased rate up to the close of the war. The fine vertical retort plant of the Unterharzen Berg und Hüttenwerke was not damaged during the war and was producing zinc from the Rammelsburg mines at the rate of 34,000 tons per year. The fine Belgian retort plant at Nordenham was kept operating at about 75 percent capacity on concentrates received from the Harz Mountain, Westphalia, and other mines.

The Stolberg zinc plant, at Munsterbusch, was badly damaged when the war swept through that area, but had been kept operating practically until the date it was seized. The Berzelius Metallhütte Gesellschaft likewise kept its horizontal retort plant in operation at Duisburg until the Allied troops moved into the Rhine area. All of these plants have been described in the literature and were operated during the war in an entirely conventional manner, as the raw materials furnished them did not change significantly during the war. Adequate supplies of zinc were discovered at all plants, and it was obvious that zinc of all grades was plentifully available in Germany. As a matter of fact, a zinc alloy contaning 0.8 percent Al and 0.4 percent Cu was cast into wirebars and rolled and drawn into wire for use as an electrical conductor where high conductivity was not essential.

Unique Antimony Operation

At the Herzog Julius Hütte of the Unterharzen Berg und Hüttenwerke a unique operation was the smelting of antimony flotation concentrates received from Austria, Hungary, and Slovakia. The concentrates averaged 40 percent Sb, 2 As, 15 S, no lead or silver, a trace of gold, 15 percent S, 4 to 5 percent Fe, and 6 to 8 percent Si, with minor amounts of Al_2O_3, MgO, and CaO. About 2,000 tons of this material was on hand and constituted about a year's supply.

The ore was smelted without roasting but with the addition of 80 percent of soda ash and 12 to 15 percent of coal breeze from the company's producer gas plant. The smelting took place in a rotary furnace similar to those used at the Bleikupferhütte but without a waste-heat boiler. Smelting took four hours, and the gross weight of the charge including the coal was 1,600 kg. Dust from the furnace was caught in three baghouses with excellent clearance, approximately 20 percent of the antimony charged going to the baghouse, and this was of course returned to the furnace charge. The slag ran 10 to 12 percent Sb, and it was claimed that it contained about 10 percent of the antimony charged to the furnace. This would mean that the direct metal fall in the furnace was 70 percent of the antimony charged The antimony slag after weathering was charged with added coke to a small vertical cupola or shaft furnace together with any low-grade ores available, and was smelted to a crude antimony metal and a discard slag running less than 1 percent Sb. A baghouse was likewise used on this shaft furnace, but the bag life was only four to five months.

The antimony metal was refined by resmelting in a reverberatory, where the arsenic was removed by poling in 200 kg. of sodium oxide for every 40 kg. of arsenic. This slag was stocked and subsequently dissolved in water, removing the arsenic, which was precipitated with lime and sold to insecticide makers. The sludge, rich in antimony, was returned to the rotary furnace. Iron in the antimony metal was removed by additions of raw sulphide ore, forming a dross which was returned to the smelting furnace. The refined antimony was cast into conventional cakes without starring and was found to be suitable for practically all purposes, even though it did not possess the starred surface. It was claimed that the over-all recovery of antimony for 1944 was 98 percent and the total cost of the smelting operation was 900 marks per ton.

In General

German metallurgy seems to be characterized by very high recoveries of all values, frequently with little regard for labor cost and even reagents consumed. It is quite understandable, with labor averaging less than 1 mark per hour, and with a plentiful supply of slave labor, that the amount of labor consumed per ton of metal produced is not a vital factor. However, the extravagant use of miscellaneous reagents is much more difficult to understand and may be due to the fact that during the war many metallurgical plants were run directly by the Government, and undoubtedly such plants were able to requisition almost anything they wished.

MARKET SUMMARY

LATE ON MAY 29 the Office of Price Administration increased maximum base prices for copper and lead, the rise taking effect on June 3, 1946. Copper was advanced 2.375c. a pound, fixing the ceiling at 14.375c., Connecticut Valley points. Lead was advanced 1.75c. a pound, establishing the ceiling at 8.25c. a pound, New York. Steady increases in costs, both labor and material, make necessary the price advances, OPA officials declared. Action in raising the price of zinc was postponed, owing in part to wide differences in opinion on the extent of the increase necessary under prevailing conditions.

Strikes at non-ferrous metal plants, which could not be settled until the OPA first acted on prices, cut deeply into the volume of business placed during May. A strike at the soft coal mines, and a two-day railroad tie-up, created much confusion. However, both the coal and railroad disputes were settled before the month ended.

Copper refineries still operating could not take care of the heavy demands of consumers for wirebars and cakes. Demand for wirebars was such that producers could have disposed of 60,000 tons a month, but hardly more than 10,000 tons was available. Some improvement in the situation is expected in June, though voluntary rationing is likely to continue. As refineries resume production, copper owned by the Government in forms not in heavy demand will be cast into wirebars, etc.

Foreign buyers purchased substantial tonnages of copper from South American producers at rising prices. Anticipation of a higher ceiling in the United States, together with a sold-up condition of Canadian and African producers, were factors in strengthening the market. The New York refinery equivalent for foreign copper advanced from 12.250c. at the end of April to 14.200c. at the end of May. England and France were buyers. The market abroad was disturbed late in the month on news that a strike closed down operations at Chile Copper.

Lead producers were disappointed in the new ceiling of 8.25c., which was viewed as "a step in the right direction but insufficient to bring out maximum production." The foreign market will continue selling lead at a premium, as the quotation outside of the United States had advanced to roughly 8½c. About 15,000 tons of lead have been un-

Major Metals

U. S. DAILY AND AVERAGE PRICES

	Electrolytic Copper		Straits Tin	Lead		Zinc
1946 May	Domestic (a) Refinery	Export (b) Refinery	New York	New York	St. Louis	St. Louis
1	11.775	12.300	52.000	6.50	6.35	8.25
2	11.775	13.250	52.000	6.50	6.35	8.25
3	11.775	13.200	52.000	6.50	6.35	8.25
4	11.775	13.200	52.000	6.50	6.35	8.25
6	11.775	13.200	52.000	6.50	6.35	8.25
7	11.775	13.175	52.000	6.50	6.35	8.25
8	11.775	13.175	52.000	6.50	6.35	8.25
9	11.775	13.650	52.000	6.50	6.35	8.25
10	11.775	13.425	52.000	6.50	6.35	8.25
11	11.775	13.575	52.000	6.50	6.35	8.25
13	11.775	13.500	52.000	6.50	6.35	8.25
14	11.775	13.775	52.000	6.50	6.35	8.25
15	11.775	13.775	52.000	6.50	6.35	8.25
16	11.775	14.175	52.000	6.50	6.35	8.25
17	11.775	13.975	52.000	6.50	6.35	8.25
18	11.775	14.175	52.000	6.50	6.35	8.25
20	11.775	14.175	52.000	6.50	6.35	8.25
21	11.775	14.400	52.000	6.50	6.35	8.25
22	11.775	14.400	52.000	6.50	6.35	8.25
23	11.775	14.150	52.000	6.50	6.35	8.25
24	11.775	14.200	52.000	6.50	6.35	8.25
25	11.775	14.200	52.000	6.50	6.35	8.25
27	11.775	14.200	52.000	6.50	6.35	8.25
28	11.775	14.200	52.000	6.50	6.35	8.25
29	11.775	14.200	52.000	6.50	6.35	8.25
30	Holiday	14.200	Holiday	Holiday	Holiday	Holiday
31	11.775	14.200	52.000	6.50	6.35	8.25
AVERAGES FOR MONTH						
May	11.775	13.780	52.000	6.50	6.35	8.25
AVERAGES FOR WEEK						
1	11.775	12.292	52.000	6.50	6.35	8.25
8	11.775	13.200	52.000	6.50	6.35	8.25
15	11.775	13.617	52.000	6.50	6.35	8.25
22	11.775	14.217	52.000	6.50	6.35	8.25
29	11.775	14.192	52.000	6.50	6.35	8.25
CALENDAR WEEK AVERAGES						
May						
4	11.775	12.729	52.000	6.50	6.35	8.25
11	11.775	13.367	52.000	6.50	6.35	8.25
18	11.775	13.896	52.000	6.50	6.35	8.25
25	11.775	14.254	52.000	6.50	6.35	8.25

Silver, Gold and Sterling

DAILY AND AVERAGE PRICES

	Sterling Exchange	Silver		Gold	
1946 May	(c) "Checks"	New York	London	London	(d) United States
1	403.250	70.750	44d.	172s. 3d.	$35.000
2	403.250	70.750	44d.	172s. 3d.	35.000
3	403.250	70.750	44d.	172s. 3d.	35.000
4	403.250	(e)	(e)	(e)	35.000
6	403.250	70.750	44d.	172s. 3d.	35.000
7	403.250	70.750	44d.	172s. 3d.	35.000
8	403.250	70.750	44d.	172s. 3d.	35.000
9	403.250	70.750	44d.	172s. 3d.	35.000
10	402.750	70.750	44d.	172s. 3d.	35.000
11	403.000	(e)	(e)	(e)	35.000
13	403.000	70.750	44d.	172s. 3d.	35.000
14	403.000	70.750	44d.	172s. 3d.	35.000
15	403.000	70.750	44d.	172s. 3d.	35.000
16	403.000	70.750	44d.	172s. 3d.	35.000
17	403.000	70.750	44d.	172s. 3d.	35.000
18	403.000	(e)	(e)	(e)	35.000
20	403.000	70.750	44d.	172s. 3d.	35.000
21	403.000	70.750	44d.	172s. 3d.	35.000
22	403.000	70.750	44d.	172s. 3d.	35.000
23	403.000	70.750	44d.	172s. 3d.	35.000
24	403.000	70.750	44d.	172s. 3d.	35.000
25	403.000	(e)	(e)	(e)	35.000
27	403.000	70.750	44d.	172s. 3d.	35.000
28	403.000	70.750	44d.	172s. 3d.	35.000
29	403.000	70.750	44d.	172s. 3d.	35.000
30	Holiday	Holiday	44d.	172s. 3d.	Holiday
31	403.000	70.750	44d.	172s. 3d.	35.000
AVERAGES FOR MONTH					
May	403.067	70.750	44d.	—	35.000
AVERAGES FOR WEEK					
F	403.250	70.750	—	—	—
8	403.250	70.750	—	—	—
15	403.250	70.750	—	—	—
22	403.000	70.750	—	—	—
29	403.000	70.750	—	—	—

Calendar week averages, New York Silver: May 4th, 70.750; 11th, 70.750; 18th, 70.750; 25th, 70.750.

(e) Not quoted (Saturday).

THE above quotations for major non-ferrous metals are our appraisal of the important United States markets, based on sales reported by producers and agencies. They are reduced to the basis of cash, New York or St. Louis, as noted. All prices are in cents per pound.

(a) Net prices at refineries on Atlantic seaboard. To arrive at the delivered New England basis add 0.225c. per pound, the average differential for freight and delivery charges.

Effective March 14, our export quotation for copper reflects prices obtaining in the open market and is based on sales in the foreign market reduced to the f.o.b. refinery equivalent, Atlantic seaboard. On f.a.s. transactions we deduct 0.075c, for lighterage, etc., to arrive at the f.o.b. refinery quotation.

Copper, lead and zinc quotations are based on sales for both prompt and future deliveries; tin quotations are for prompt delivery only.

Quotations for copper are for the ordinary forms of wirebars and ingot bars: cathodes are sold at a discount of 0.125c.

Quotations for zinc are for ordinary Prime Western brands. Zinc in New York commands a premium over the St. Louis basis equal to the freight differential. Contract prices for High Grade zinc delivered in the East and Middle West in nearly all instances command a premium of 1c. per pound over the current market for Prime Western but not less than 1c. over the *Engineering and Mining Journal's* average quotation for Prime Western for the previous month.

Quotations for lead reflect prices obtained for common lead.

(c) Silver other than newly-mined domestic, by Handy & Harman. Under Treasury order of July 6, 1939, the price on domestic newly-mined silver mined subsequent to July 1, 1939, was fixed at 71.11c. per troy ounce. Handy & Harman's quotation on newly-mined domestic silver 999 fine was 70⅝c. throughout May.

London silver in pence per troy ounce.

(d) U. S. Treasury's gold price. Actual payment by the United States Treasury for gold in domestic and imported ore or concentrate is at 99.75 per cent of the price quoted by the Treasury, which is equal to $34.9125.

covered in Japan, and this metal is expected to come to the United States. Imports of lead under the Government's purchasing program have dropped to less than 7,000 tons a month. Refineries in the United States produced only 23,766 tons of lead in April, against 46,511 tons in April a year ago. Current demand could absorb between 70,000 and 75,000 tons of refined lead a month.

The United States stands ready to extend the Bolivian tin contracts on the basis of 62½c. a pound, plus a bonus of 1c. for shipments in excess of the 1943-44 average. Bolivians want at least 65c. a pound of tin contained in concentrates.

Removal of the rider on silver from the appropriations bill has been agreed upon in the Senate. A separate bill has been introduced covering the same ground. Delay in acting on the proposed silver legislation has created an extremely tight situation in the market for the metal.

OPA exempted refined platinum from price control and the quotation jumped to $56 an ounce troy on May 6.

Miscellaneous Metals Monthly Averages

Average prices of miscellaneous metals for April and May:

(a) New York, packed in cases, in lots of 5 tons or more but less than a carload. (b) Nominal. (c) Producer's price for commercial sticks. (d) Average producers' and platers' quotations. (e) Special shapes sold to platers.

	April	May
Quicksilver, N. Y. flask	102.462	101.000
Antimony (a)	15.839	15.839
Antimony, bulk, Laredo	14.500	14.500
Antimony, bulk, N. Y.	15.265	15.265
Antimony, Chinese (b)	16.500	16.500
Platinum, oz. troy	35.000	52.769
Cadmium (c)	90.000	90.000
Cadmium (d)	92.500	92.500
Cadmium (e)	95.000	95.000
Aluminum ingot	15.000	15.000

E & M J Price Index

Weighted index of non-ferrous metal prices (copper, lead, zinc, tin, silver, nickel, and aluminum). The average for the years 1922-1923-1924 equals 100.

1929	110.33	1937	90.86
1930	82.87	1938	73.67
1931	60.20	1939	77.71
1932	48.26	1940	79.22
1933	59.79	1941	83.49
1934	65.59	1942	86.80
1935	74.66	1943	88.74
1936	73.45	1944	88.74
		1945	90.86

	1944	1945	1946
January	88.74	88.74	96.42
February	88.74	88.74	96.42
March	88.74	88.74	96.42
April	88.74	88.74	96.42
May	88.74	88.74	96.42
June	88.74	88.74	....
July	88.74	88.74	....
August	88.74	88.74	....
September	88.74	91.16	....
October	88.74	96.40	....
November	88.74	96.42	....
December	88.74	96.42	....

Miscellaneous Metals, Ores, Minerals

Quotations cover wholesale lots, prompt shipment, f.o.b. New York, unless otherwise stated

MISCELLANEOUS METALS

(June 1, 1946)

Aluminum, ingot, 99 plus per cent, lb.	15c.
Antimony, domestic, spot, lb., 5 tons or more	15.839c.
Bismuth, ton lots, lb.	$1.25
Cadmium, commercial sticks, lb.	90c.
Calcium, lb., ton lots, 97 @ 98 per cent, cast	$1.85
Chromium, 97 per cent grade, lb.	89c.
Cobalt, 97 to 99 per cent, per lb.	$1.50
Indium, troy oz.	$2.25
Nickel, electrolytic cathodes, lb.	35c.
Magnesium, 99.8 per cent, carloads, lb.	20½c.
Palladium, troy oz.	$24.00
Platinum (Official quotation) troy oz.	$56.00
Quicksilver, flask of 76 lb., 25 flasks or more	$100.00
Selenium, 99.5 per cent, lb.	$1.75
Silicon, minimum 97 per cent, spot, carloads, lb.	14.75c.
Tellurium, lb.	$1.75 nom.
Thallium, 100 lb. or more, lb.	$12.50 nom.
Titanium, 96 to 98 per cent, lb.	$5.00

METALLIC ORES

Beryllium Ore, 8 to 12% BeO, f.o.b. mine, per unit	$8.00@$10.00
Chrome Ore, per long ton, f.o.b. cars Atl. ports, dry 48%	
Cr_2O_3, 2.8 to 1 ratio (Prices nominal)	$41.00
48% Cr_2O_3 3 to 1 ratio	$43.50
Iron Ore, Lake Superior, Lower Lake ports, long ton:	
Old Range bessemer	$4.95
Mesabi bessemer	$4.70
Old Range non-bessemer	$4.80
Mesabi, non-bessemer	$4.55
Lead (Galena) 80 per cent, Joplin, Mo., ton	$76.01
Manganese, Metals Reserve Co. sales price, per long-ton unit of Mn contained, 48 per cent, subject to premiums and penalties, effective May 15, 1944: 85c. (duty paid) New York, Philadelphia, Baltimore, Norfolk, Mobile, and New Orleans; 91c., Fontana, Calif., Provo, Utah, and Pueblo, Colo. (Current prices in open market nominal at 73@75c. per long-ton unit.)	
Molybdenum Ore, 90%, per lb. of MoS_2 f.o.b. mines	45c.
Tungsten Ore, per unit of WO_3:	
Chinese, 60 per cent, duty paid	$24.00
Domestic, scheelite, 60 per cent and upward	$24.00
Vanadium Ore, per lb. of contained V_2O_5 f.o.b. mines	27½c.
Zinc Ore, Prime, 60 per cent concentrate, Joplin, Mo.; per ton	$50.00

METALLIC COMPOUNDS

Arsenic Oxide (arsenic) lb.	4c.
Cobalt Oxide, 70 @ 71 per cent, lb.	$1.06
Copper Sulphate, 100 lb.	$5.00

ALLOYS

Beryllium Copper, 2.5 to 3 per cent Be, per lb. of contained Be	$15.00
Ferrochrome, 65 @ 70 per cent per lb. of Cr contained	13c.
Ferromanganese, 78 @ 82 per cent, gross ton	$135.00
Ferromolybdenum, 55 @ 65 per cent Mo, lb. of Mo contained	95c.
Ferrosilicon, 50 per cent, per lb. of contained Si	6.60@8.10c.
Ferrotungsten, 75 @ 80 per cent, lb. of W contained	$1.90
Ferrovanadium, per lb. of V delivered	$2.70@$2.90
Silicomanganese, 1 per cent C, gross ton	$138.00

NON-METALLIC MINERALS

Asbestos, f.o.b. Canadian (Quebec) mines (U. S. funds), ton:	
Crude No. 1	$650@$758
Crude No. 2	$165@$385
Spinning fibers	$124@$233
Paper stock	$44@$49.50
Shorts	$14.50@$26.50
Vermont, f.o.b. Hyde Park:	
Shingle stock	$62.50@$65.00
Paper stock	$44.00@$53.00
Shorts	$14.50@$28.50
Floats	$19.50
Barytes, f.o.b. mines:	
Georgia, crude, per long ton	$8.50@$9.00
Missouri, 93 to 94 per cent $BaSO_4$, per short ton	$8.25@$8.50
Bauxite, long ton:	
Domestic, crude, 50 @ 52 per cent (not dried)	$5.00
Domestic, chemical, 55 @ 58 per cent	$7.50@$8.50
Domestic, abrasive, 80 @ 84 per cent	$16.50
China Clay, f.o.b. mines, ton:	
South Carolina and Georgia, No. 1, bulk	$6.75@$8.00
Delaware, No. 1	$15.00
Feldspar, bulk, ton:	
Potash feldspar, 200 mesh	$17.00
Glass spar, white, 20 mesh	$11.75
Fluorspar, f.o.b. mines, bulk, Kentucky and Illinois 60 per cent, all rail movement, ton	$30.00
Acid 98 and 1 per cent, bulk, ton	$37.00
Fuller's earth, f.o.b. Georgia or Florida, ton	$7.00@$14.00
Magnesite, per ton dead-burned, f.o.b. Washington	$22.00
Mica: Domestic producers quote on punch and sheet as follows: Punch, 22c. per pound; 1½x2 inch, $1.10; 2x2 inch, $1.60 2x3 inch, $2.10; 3x3 inch, $2.75; 3x4 inch, $3.50; 3x5 inch, $4; 4x6 inch, $5. Wet ground, very fine, $90 per ton. Special grades command premium. Bulk sales dry ground, $32.50 per ton; Scrap, $28 per ton and up.	
Ocher, Georgia, ton	$19.00@$22.00
Pyrites, Spanish, per long ton unit of S, c i f. Atlantic ports	12c. nom.
Silica, in bags, 325 mesh, ton	$20.00@$40.00
Sulphur, Texas, mines, long ton	$16.00
Talc, f.o.b. works, ton:	
New York, double air-floated, 325 mesh	$12.00@$15.00
Vermont, extra white, 200 mesh	$9.50@$10.50
Tripoli, Missouri, ton:	
40 mesh, cream colored	$14.50

IRON AND STEEL

Pig Iron, Valley furnaces, gross ton: Basic	$26.00
Steel, base price, Pittsburgh Billets, gross ton	$39.00
Structural shapes, 100 lb.	$2.85

WASHINGTON REFLECTIONS

McGRAW-HILL WASHINGTON NEWS BUREAU

Wages and Prices Move in Unison, Stabilizers Learn

Soon after the fact-finding board issued its report late in April, officials in Washington learned that a settlement of the wage dispute in the nonferrous industry was a far more complex matter than those not directly concerned with problems of management could have foreseen.

Meetings in Washington brought out that more than a mere promise to lift prices to offset wage boosts would be essential before operations at the mines, mills, smelters and refineries could start up. The American Smelting & Refining Co. let it be known that "until we are informed as to what price increases are to be made and as to what steps are to be taken to correct this hardship we are unable to determine what wage increases can be granted."

Before May ended it was generally understood that a practical solution of the problem was discussed and accepted, which would lead to a general upward revision of the ceiling prices of copper, lead, and zinc. Consumers were heard from and it became clear that the growing shortage of materials was fast closing down manufacturing plants in key industries. To smooth out possible legal complications, the Wage Stabilization Board on May 23 issued a blanket order giving automatic approval of wage increases up to 18½c. an hour to most of the non-ferrous metal-mining industry.

This turn-about in policy was forced on OPA officials who until recently insisted that labor disputes should be settled before any price hike could be agreed upon. Paul Porter, OPA chief, so informed Senator McFarland early in May, adding that action on the Anaconda contract by the National Wage Stabilization Board is, of course, nesessary before his office can compute finally the amount of deficiency arising out of the wage issue. This stand, Washington observers claim, placed the Senator from Arizona in a difficult position. He ceased pushing his own bill for price relief and openly urged that producers accept the plan backed by OPA. It was felt in legislative circles that a general price advance, following the pattern of the McFarland bill, would achieve the same objective with far less delay than that required to enact new legislation. Furthermore, it was conceded that renewal of OPA in one form or another is assured.

In reference to copper, the McFarland bill would have raised the ceiling price to 15c., Connecticut Valley base. Those close to OPA guessed that the pricing agency wished to stop at around 14c.

To make all things strictly legal, OPA came up with some strange ideas on copper pricing, as: "An estimated future average deficiency in base period operating margins, excluding effect of future wage and salary increase, of 1.80c. a pound; an estimated future effect of general wage settlements of 18½c. an hour with corresponding salary increases, of 0.52c. a pound, bringing the total estimated future average deficiencies in base period operating margins after wage and salary settlements of 2.32c. a pound." In most quarters this was interpreted as meaning that those who have not yet signed up under the proposed wage boost would have to live with a ceiling price of 13.80c. a pound, and those who have granted the rise in wages could sell at 14.32c. No doubt the OPA boys hit on this idea as a purely temporary measure. However, a two-price system was put into effect in wire products.

Toward the end of May it became known that a business like approach to the pricing problem would prevail. In reference to copper, 14.375c. was the price agreed upon.

Interior Budget Cut Will Curtail USBM and USGS

Charging that the metals and mining industry has not supported the Bureau of Mines' expanded research program, Dr. Reginald S. Dean, assistant director of the Bureau, has outlined what the Congressional paring of the Interior Department budget will mean to industry next year.

"All pilot-plant experimental work carried on by the Bureau will stop under the drastically reduced budget. With the loss of the pilot plants, the findings on new processes will be taken only to the laboratory stage and will be of value only to those industries willing to spend the large amounts of money necessary to complete the cycle of development to the commercial stage," Dr. Dean said.

"The pilot plant experiments carried on by the Bureau were undertaken with the express aim of shortening the period between the laboratory development of an idea and its final commercial stage," the executive pointed out, adding that "even the laboratories will be cut down considerably in staff and operating expenses."

The House Committee on Appropriations explained in its report on the 1947 appropriations that the Bureau was told last year to plan a drastic reduction of its activities at the end of the war. "During the war the Bureau, like the Geological Survey, performed outstanding services in the location and development of new ore reserves and carried on research and experimental work which resulted in the development of important new discoveries," the committee report states.

"While it is true, that activities set up as national defense measures have been eliminated (in the 1947 budget estimate), they reappear in the form of new requests for appropriations in amounts paralleling those justified solely on a wartime basis in previous years," the committee explained, adding that it was "strongly opposed to this unjustifiable procedure and recommends very substantial reductions in such requests."

The 1947 appropriations for the Bureau, about $6,000,000 less than the 1946 appropriations, will, according to Dr. Dean, mean the firing of many of the experienced metallurgists now at work in the Bureau. Many of these men, with 20 to 30 years' experience, will leave, with World War II veterans of a few years' metallurgical experience carrying on some of their work.

Since 1939 the number of metallurgists, supervisors, assistants, and other personnel has increased tenfold. Salaries were also hiked during the war years. "We will be worse off in 1947 than we were in 1939," according to Dr. Dean.

The statistical branch of the Bureau will be reduced under the appropriations to about its 1936 level. During the war this office was given $550,000 in direct appropriations and received approximately $900,000 from the War Production Board and the Solid Fuels Administration to carry on work for those agencies. Now the office must take over the same work, but is losing the funds appropriated from WPB and fuels in addition to another $50,000 lopped off by Congress.

Under this reduction most of the economic services furnished industry will be eliminated or drastically reduced. All of the improved statistical services on non-ferrous and steel scrap recovery, greatly improved since 1936, will be dropped and only an annual survey, which has been carried on since 1910, will be continued.

Statistics on consumption and inventories of minerals, started in 1939 for defense and war programs, will stop. Special information computing ebb and flow of strategic and critical minerals, on many of which no data are available prior to 1939, will be eliminated.

Coal statistics will be drastically reduced, to the basic minimum facts on production. The weekly and monthly services on coal and petroleum will continue on a curtailed basis, but all data on the distributions of all types of coal will end. Virtually all monthly and quarterly statistical statements on

metals and minerals will be cut out.

The Geological Survey's geological and topographical mapping of important sections of the country will be curtailed under the reduced appropriation. These, and the water-resources investigations, are the major long-range programs on which the Survey bases most of its investigations. Among the investigations coming into the limelight will be those for fissible materials on all lands held by the Government and being readied for return to private ownership or put up for sale, as provided by the registration applicable to the situation.

Erase Royalty Provision From Appropriations Bill

Advocates of public control of all natural resources failed in an effort to put over their ideas when an item calling for the Bureau of Mines to collect royalty payments from owners of private property on which exploration and development work has been carried out was omitted from the Interior appropriations bill on a point of order.

According to the hearings before the subcommittee of the Committee on Appropriations (Part I, page 451), Dr. Sayers, Director of the Bureau of Mines, submitted a change in language which is as follows: "Provided, that the Director of the Bureau of Mines is hereby authorized and directed to make suitable arrangements with owners of private property upon which exploration or development work is performed for payment by such owners of a reasonable percentage, as determined by the Secretary of the Interior, of the total value of the minerals thereafter produced from such property, except that when the exploration and development work is done for the sole purpose of completing an over-all program of exploration and development for the government, such arrangements may, in the discretion of the Secretary, be waived." This language appeared on page 59, line 18 to 24 of the Interior Appropriations Bill as it was reported by the committee for consideration of the House of Representatives. The provision was part of the paragraph dealing with the investigation and development of domestic mineral products except fuels.

The point of order was made regarding this provision that it was legislation in an appropriations bill, and it was thrown out. However, similar language appearing under the paragraph dealing with coal investigations still remains. As coal already is under the control of the Minerals Leasing Act, it may not be disastrous if it should slip through, except that it establishes a precedent.

The idea behind the language inserted in the bill by Dr. Sayers is contrary to Section 5 of the Act establishing the Bureau of Mines, which reads in part: "Sec. 5. That for tests or investigations authorized by the Secretary of the Interior under the provisions of this Act, other than those performed for the Government of the United States or State Governments within the United States, a reasonable fee covering the necessary expenses shall be charged, according to a schedule prepared by the Director of the Bureau of Mines and approved by the Secretary of the Interior, who shall prescribe rules and regulations under which such tests and investigations may be made." This is also contrary to the idea expressed in the President's budget message to Congress for the fiscal year of 1947, which deals with the investigation and development of domestic mineral deposits. This contained the provision, "That the Bureau of Mines shall require owners of private property upon which work is performed to enter into contract to repay the cost of such work through the assessment of royalties on the production of such minerals obtained therefrom as indicated by the Bureau's work. . . ."

Separate Silver Measure Offered by Senate Group

To avoid embarrassing fellow Senators by forcing them to vote against the Treasury-Post Office Appropriations Bill because of the silver rider attached to it, Senators from the silver-producing states introduced a new bill which contains the same wording as the rider.

The new bill, which amends one approved July 6, 1939, sets the price of silver at 90.5c. per ounce troy for two years, after which time the price will revert to the "full monetary value" of $1.29. The amendment provides that until June 30, 1948, the Director of the Mint, with the consent of the owner, shall deduct and retain 30 percent of such silver received as seigniorage for services performed relative to coinage and delivery of silver dollars. The balance, 70 percent, shall be coined into standard silver dollars, and be delivered to the owner of such silver.

On or after July 1, 1948, there shall be delivered in standard silver dollars or any coinage the full monetary value of the silver, less deductions for mint charges, provided that such mint is satisfied the silver was mined subsequently to June 30, 1948.

The bill further authorizes the Treasury to sell for domestic manufacturing uses any nonmonetized silver at a price not less than 90.5c. for two years and thereafter at $1.29, provided that such sales be made after the purchaser has certified in writing that it is to be used in domestic industry or the arts and within a period of six months. The final clause of the bill provides that hereafter, notwithstanding the provisions of any other law, maximum prices shall not be established or maintained on standard commercial bars or other forms of silver bullion, whether foreign or domestic or Treasury, semifabricated silver articles, silver scrap, or the processing of silver or silver scrap.

Health-Benefit Program No Invention of Lewis'

John L. Lewis' idea for a health-benefit plan for his miners is not new in contractual relationships between employers and unions in this country and abroad, but the amount he asked for is two or three times as much as is ordinarily allocated by industry.

Health-benefit programs covering more than 600,000 workers have been worked out under agreements negotiated in various industries, according to the Department of Labor.

Three types of plans are in effect: those administered solely by the union, those administered jointly by the union and the employer, and those administered by a private insurance company which undertakes the responsibility for determining eligibility claims and payments of benefits.

About a third of the employees covered by health-benefit clauses are under plans administered jointly by the union and the employer. Another third by the unions directly.

In this country there are approximately 20 AF of L and CIO unions holding contracts which include health-benefit programs, the records of the Department of Labor show. Similar ideas have been incorporated in the contracts or agreements of many of the miners' unions in England, the Netherlands, Belgium, Spain, New Zealand, and India.

In these foreign countries a special tax on each ton of coal mined provides all or part of the funds used for benefits. The tax usually ranges from 1.5 to 4c. (American scale) per ton of coal mined. Mr. Lewis wanted 10c. a ton.

In the United States most of the benefits are financed entirely by the employer. Only a few of the jointly administered agreements and less than half of those managed by insurance companies require both employees and the employing organization to contribute to the fund.

Most of the plans include weekly disability benefits ranging from 50 to 60 percent of an employee's regular earnings, or, where fixed benefits are stipulated, from $10.50 to $20 a week. The time allowed for receiving benefits usually covers from 13 to 26 weeks for one continuous disability.

Disability caused by occupational accidents which are covered by workmen's compensation are excluded from coverage in virtually all of the plans. Few of the agreements provided through collective bargaining require medical examination of covered employees, although pre-employment medical examinations are given in some. There are no age limitations except that disability payments are frequently limited to 13 weeks for any single disability for persons more than 60 years of age.

Surplus funds, under union-administered or joint plans not underwritten by an outside insurance company, are customarily converted into increased benefits.

NEWS OF THE INDUSTRY

OPA Raises Base Prices For Copper and Lead

Effective June 3, 1946, the Office of Price Administration increased maximum base prices for primary and secondary copper and lead, brass ingots, brass-mill products, copper wire and cable, and copper and lead scrap. The ceiling price of copper was fixed at 14.375c. a pound, Connecticut, and lead was established at 8.25c. a pound, New York. Price action on zinc was not included in the announcement released in Washington on May 29.

This action followed announcement by the National Wage Stabilization Board that blanket approval would be given to pay increases in the nonferrous metal mining industry up to 18½c. per hour above straight-time rates in effect Aug. 17, 1945, thus paving the way for eligible companies to use wage increases for purposes of seeking price relief from OPA or for increasing costs to the Government. The pre-approval was restricted to companies named in the recent recommendations of the federal fact-finding board and to others engaged in the mining, milling, smelting, or refining of copper, lead, zinc, or associated by-products whose operations are situated in eleven specificed Rocky Mountain states and Alaska. It will be in effect only where a wage or salary adjustment has been finally determined or agreed upon by the parties involved, and does not constitute a standard for approvability of increases in any facility not meeting the definition of eligibility.

18½c. Awards End Strikes At Mascot and Miami

The three-month-old strike at Mascot, Tenn., came to an end on May 4 when the American Zinc Co. granted employees an 18½c. per hour increase, including 5c. per hour retroactive to Jan. 17, 1946, the date of the wage demand. Approximately 530 workers were involved.

Mine and smelter workers of the Inspiration Consolidated Copper Co., Miami, Ariz., received an 18½c. per hour increase, with retroactive provisions to Feb. 7, 1946. Strike action was forestalled by conclusion of the negotiations.

The American Brass Co. on May 19 granted workers at its Connecticut plants an 18½c. hourly increase, ending a strike which had been in progress for 15 weeks. The company also agreed to cash settlement of bonus payments for wartime swing-shift overtime.

At mid-May Utah operators and union representatives were holding separate conferences with a special conciliator sent to Salt Lake City by the Department of Labor in an effort to arrive at a workable formula.

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WAA Approves U. S. Steel Bid on Utah Plant

The War Assets Administration approved on May 23 sale of the Government's wartime steel plant at Geneva, Utah, to the United States Steel Corporation for $47,500,000. The sale includes iron and coal mines, quarries, and inventories accessory to the plant, which was the largest operated by the Government and represents an original outlay of $191,000,000. Consummation of the sale awaits approval of the Department of Justice.

Two years has been estimated as the time necessary to equip the plant for peacetime operation. The steel corporation has indicated intentions of spending $18,600,000 in reconverting the plant to production of semi-fabricated steel.

Assessment Work Suspension Order Still Applies

Provisions of the act of Congress (H.R. 2370) of May 3, 1943, suspending requirements for annual assessment work on mining claims held by location, remain in effect. The law stipulates that the assessment work provisions of Section 2324 of the Revised Statutes of the United States shall be suspended until noon of the first day of July following cessation of hostilities as determined by presidential proclamation or concurrent resolution of the Congress.

An official ending of hostilities at any time before noon of July 4, 1946, would automatically entail performance of assessment work for the assessment year terminating July 1, 1947. Otherwise, claim owners in the United States and Alaska will enjoy a moratorium of at least another year beyond July 1, 1947.

The act of May 1943 does require, however, filing at the office of record, on or before noon of July 1, 1946, notice of intention to hold mining claims.

House Revisions Alter Senate Stockpile Bill

The House of Representatives has passed a revised version of the stockpiling bill which places administration of the stockpile jointly under the Secretary of War and the Secretary of the Navy instead of the new agency designated in the May-Thomas measure (S.752). Appropriation authorizations are limited to $1,800,000,000 over a five-year period, but funds received from sales would remain available for further purchases. The Senate set no limit on appropriations, but directed that proceeds of sales be paid into the Treasury. A section of the Senate bill permitting duty-free importation of materials purchased from foreign sources was deleted by the House. Differences in the two versions remain to be ironed out in conference.

NEWS BRIEFS

Montana Mining Association Meeting. The summer meeting of the Mining Association of Montana will be held Aug. 30 and 31 at Missoula.

Mining Congress Metal Convention. The annual metal-mining convention and exposition of the American Mining Congress will be held Sept. 9 to 12 in Denver.

Anniversary Meeting, A.I.M.E. The American Institute of Mining and Metallurgical Engineers will celebrate its 75th anniversary at a three-day meeting in New York Sept. 16 to 18.

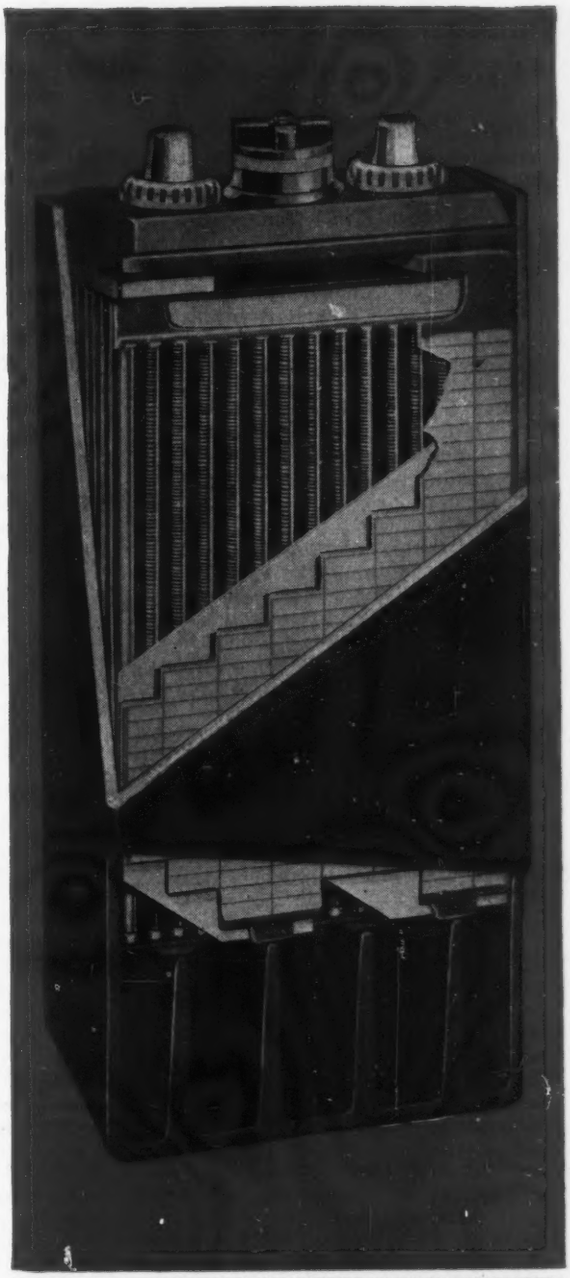
Risks of Canadian Mining. Out of every four and a half mining claims staked in Canada, only one reaches the stage of company incorporation, according to a recent report of the Ontario Mining Association. Profitable operation is achieved by only one out of every hundred companies formed to develop mining properties.

Lead Discovery. A "rich lead deposit" is reported from Shanghai as having been found on the Shansi-Chahar border near Tienchen. Development will be undertaken by the Tienchen Mining Co., in which the Hsinghua Industrial Co. will invest $50,000,000 Chinese ($25,000 U. S. Cy.).

Indian Gold. A new gold property is reported at Ballara, 60 miles from Bangalore, Mysore, India.

Exide

IRONCLAD BATTERIES



BUILT FOR PEAK PERFORMANCE AND LONG LIFE IN HEAVY-DUTY SERVICE...

The Exide-Ironclad is a different type of battery . . . in design, construction, service qualities. It was developed to meet the need for a battery to deliver high, sustained power in heavy-duty service over a long period of time.

THE POSITIVE PLATE is unique in battery design. It consists of a series of slotted, vertical, hollow tubes which contain the active material (See illustration at left). The slots in the tubes are so fine that, while they permit easy access to the electrolyte, they prevent the lead oxide from readily washing out, thus adding considerably to the life of the plate.

THE NEGATIVE PLATE has been designed and is built to equal the increased life of the positive plate. Like the positive plate, it has two feet at the bottom to raise it above the two supporting ribs.

SEPARATORS are made of Exide Mipor, a special rubber composition, and will match the long life of Exide-Ironclad plates. The cutaway illustration shows how separators rest on ribs well below bottom of plates, thus making probability of internal short circuits very remote.

THE EXIDE-IRONCLAD ASSEMBLY is sealed in jars of Giant Compound. Jars are practically unbreakable in normal service.

THE RESULT is an efficient, ruggedly built battery that assures dependable performance, long life and maximum economy . . . a battery that fully measures up to each service requirement . . .

★ ***HIGH POWER ABILITY*** . . . needed in frequent "stop and go" service.

★ ***HIGH MAINTAINED VOLTAGE*** throughout discharge.

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★ ***RUGGED CONSTRUCTION*** . . . for long life.

Exide-Ironclads are supplied in sizes to suit every application, including mine locomotives, trammers and shuttlecars of every size and make.

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 32
Exide Batteries of Canada, Limited, Toronto

Mineral Resources Controls Held Uneconomic At U.S. Chamber of Commerce Meeting

Encouragement of a sound domestic extractive industry was advocated as the most effective guarantee of future mineral sufficiency by representatives of the mining industry who participated in a round-table conference on the subject, "Our 'Vanishing' Natural Resources," at the annual meeting of the U. S. Chamber of Commerce on May 2 at Atlantic City, N. J. W. O. Broadgate, technical consultant to the Mining and Minerals Subcommittee of the Senate Small Business Committee, and Evan Just, editor of Engineering and Mining Journal, led the discussions dealing with minerals, other than petroleum and coal.

Dangers inherent in public acceptance of the theory of scarcity, as propounded by uninformed conservationists, were cited. A policy which predicates the need for sequestering known mineral reserves against the demands of a future emergency would arrest technical progress, condemn many now accessible low-grade orebodies, and cripple the industry without whose personnel, plant, and technical skill a public reserve would have scant emergency usefulness. The reserves made available for consumption by keeping a progressive industry in being would undoubtedly exceed those accumulated under a policy of "lock-up" conservation.

Mineral resources were categoried into four groups: plentiful; limited; dispensable; and strategic. The plentiful group includes coal, iron ore, magnesium, salt, potash, phosphates, molybdenum, limestone, sand, construction and ceramic materials, aluminum, manganese, sulphur, and vanadium. Minerals in important but limited reserve, rated essential to our economy are mercury, lead, copper, zinc, cadmium, silver, tungsten, chromite, block mica, and fluorspar. In the dispensable class, defined as convenient but not necessary to the national economy, are barite, diatomite, fuller's earth, garnet, corundum, scrap mica, titanium, and, from the industrial viewpoint, gold. The strategic group includes tin, nickel, antimony, platinum, tantalum, cobalt, asbestos, flake graphite, industrial diamonds, and quartz crystal. The apparently small domestic reserves of strategic minerals dictates stockpiling as a precaution against a national emergency. Development of domestic low-grade sources of the supremely important atomic energy materials, uranium and thorium, may prove feasible but involves much guesswork at present.

As to the actual extent of reserves, the view was expressed that published statistics dealing with "commercial ore reserves" tended to mislead the public by failing to emphasize potentially commercial lower-grade ores which, on past performance, progressive technology will probably find ways of utilizing. Accurate estimation of total reserves is further obscured by the circumstance that the principal sources of mineral production up to now have been deposits characterized by surface manifestations and thus easily located by prospectors or elementary applications of geology and geophysics. Undoubtedly many concealed deposits remain undiscovered which may be detected by applied geological and geophysical science. Few important new discoveries, except of petroleum, have been made in our generation. The mining industry has been able to supply consumer needs primarily by extending known deposits and by improving techniques of extraction, beneficiation, reduction, and refining. Some ores, like those of mercury, are seldom blocked out ahead in quantity, and exhaustion appears imminent from year to year, yet an adequate price serves to bring out sufficent quantities. It was noted, also, that tax laws do not encourage the reporting of large reserves.

Imports Must Be Limited

Complications were foreseen if sole dependence were to be placed on imports. Such a program, with all tariff protection removed, would discourage private exploration and development while tending to reduce "commercial" reserves through the selective mining out of higher-grade ores in competition with cheaper foreign ores. Imports of strategic metals and minerals of which there is an obvious shortage should not be shut off, but the rate of importation should be subordinated to a policy of encouraging a healthy domestic industry. Tax laws should be revised to permit the return of mining investments and profits commensurate with the risks involved. Subsidies, if used, should be non-discriminatory and aimed at facilitating extraction of marginal ores, now accessible, which might be permanently lost were the mines permitted to shut down. A sensible stockpiling program, such as is now being considered by Congress, would serve as a cushion against future emergency demands.

The changing utility of materials was cited as a factor closely related to the subject of conservation. Potential uses of minerals and metals is dependent on the technology peculiar to a given period of economic and scientific history. To date the range of usable materials has been on the increase. Most if not all of the applications of minerals and metals are susceptible to substitution. Shifts from one material to another may cause a mineral in the ground which today is an asset tomorrow to become almost valueless.

The conclusion was reached that true conservation of domestic mineral resources hinges upon continued production at adequate prices to encourage accelerated development and provide private enterprise the incentive to make new discoveries. Government should further the marginal mining of ores where conservation may best be served by continuous extraction. Such a program should embrace either sale or stockpiling of production, according to expediency, while permitting minimum interference with private industry.

Atomic Power Development Program Is Projected

An experimental atomic energy power plant will be constructed at Oak Ridge, Tenn., according to an announcement made by the Manhattan Engineer Project on April 12. The plant will be designed, built, and operated under the over-all authority and responsibility of the Monsanto Chemical Co., and will be based on fundamental research carried out at the metallurgical laboratory of the University of Chicago under the direction of Dr. Farrington Daniels.

The initial power unit, it is stated by Major General L. R. Groves, head of the Manhattan Engineer Project, will involve the experimental operation of a chain reaction pile together with auxiliary equipment. Explosive hazards will be absent. When the pile is ready to operate, possibly late in 1946, radio-active fuel will be introduced into the pile structure under controlled conditions, and a chain reaction will get under way, with resultant conversion of mass into heat energy and finally mechanical into electrical energy. It is emphasized that the unit is to be a pilot plant and must be viewed as a scientific experiment rather than an economically practical application of nuclear fission for generation of electricity.

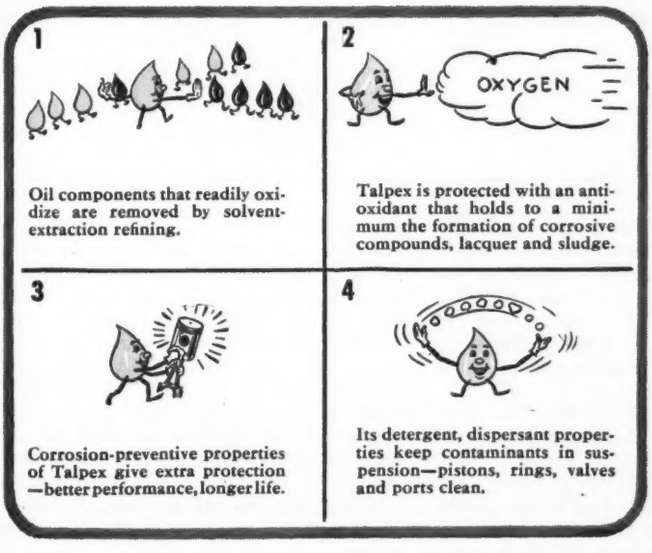
Scientists connected with the Manhattan Project will assist throughout the undertaking, as well as specialists of the Army and Navy and consultants from various industrial organizations.

Initial expenditure for the experimental unit has been tentatively placed at $2,500,000.

Placer Operations Add to Domestic Gold Output

California again leads all other states in the production of gold. United States Bureau of Mines figures covering mine output of gold and silver for the first three months of 1946 show that California produced 29,000 oz. of gold in March, compared with 20,100 oz. in January. The gain is traced to the growing scale of dredging operations. Colorado also increased its gold output as the result of greater placer activity. South Dakota's monthly average of 21,200 oz. for the first three months reflects return to about half normal capacity at Homestake, and is

THESE FOUR *TALPEX* PERFORMANCE FACTORS SAFEGUARD HIGH-SPEED DIESELS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Oil components that readily oxidize are removed by solvent-extraction refining.
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Talpex is protected with an anti-oxidant that holds to a minimum the formation of corrosive compounds, lacquer and sludge.
3
Corrosion-preventive properties of Talpex give extra protection —better performance, longer life.
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Its detergent, dispersant properties keep contaminants in suspension—pistons, rings, valves and ports clean.

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in sharp contrast with 1944's monthly average of 968 oz. under L-208. In Idaho and Montana a decrease in lode-mine production during March was more than compensated by an increase in placer output.

Labor shortage in the Western states is still indicated to be a retarding factor in gold production. Base metal mines tend to have first call on available labor. The current rate of production is estimated to be about 80 percent lower than the record rate of 1941. The proportion of byproduct gold to primary gold production continues abnormal. Currently copper mines account for an estimated 40 percent of total production, compared with 11 percent in 1941.

Silver production in March declined slightly on the basis of the shorter February working period. Loss of byproduct output of strike-bound mines and smelters in Arizona, New Mexico, Utah, Nevada and Montana has reduced total silver production 39 percent below the 1945 monthly average of 2,372,248 oz.

Mine production of recoverable gold and silver in fine ounces is shown in the accompanying tables.

Gold Production

Region and State	1945 (Monthly Average)	1946 January	1946 February[a]	1946 March
Eastern States	162	147	55	159
Western States:				
Arizona	6,233	5,650	5,522	5,821
California	[a]11,756	20,100	23,000	29,000
Colorado	8,226	9,520	9,389	11,230
Idaho	1,586	950	900	1,100
Montana	3,570	3,650	3,000	3,100
Nevada	7,865	6,800	7,400	7,500
New Mexico	417	370	370	269
Oregon	357	680	509	1,750
South Dakota	4,662	22,584	20,041	21,000
Utah	22,693	14,800	2,000	2,250
Washington	4,879	4,750	5,450	5,500
Wyoming	[b]	.....	.....	.....
	[a]72,244	89,854	77,581	88,520
Alaska	[c]5,107	[c]1,460	[c]6,590	[a]196
Total United States	[a]77,513	91,461	84,226	88,875

[a]Revised figures; [b]Less than one-half ounce; [c]Alaska monthly totals based on mint and smelter receipts.

Silver Production

Region and State	1945 (Monthly Average)	1946 January	1946 February[a]	1946 March
Eastern States	8,145	7,007	6,644	8,254
Central States	10,068	7,228	6,544	6,686
Western States:				
Arizona	283,466	300,000	271,000	219,000
California	85,009	130,000	75,000	80,000
Colorado	183,218	160,273	187,177	187,166
Idaho	668,068	425,000	517,000	664,600
Montana	493,964	325,000	271,000	267,500
Nevada	82,588	87,000	77,000	68,000
New Mexico	38,113	23,006	24,904	17,409
Oregon	898	135	85	295
South Dakota	3,627	9,219	7,747	8,000
Texas	1,561	18	.....	.....
Utah	508,599	365,000	175,000	197,000
Washington	23,135	20,000	17,000	22,000
Wyoming	[b]	.....	.....	.....
	2,372,248	1,844,651	1,622,913	1,730,970
Alaska	[c]735	[c]200	[c]990	[c]40
Total United States	2,391,196	1,859,086	1,637,091	1,745,950

[a]Revised figures; [b]Less than one-half ounce; [c]Alaska monthly totals based on mint and smelter receipts.

Free Metal Market Seen Relieving Lead Shortage

Addressing a meeting of the Mining and Metallurgical Society of America in New York on April 30, Clinton H. Crane, president of the St. Joseph Lead Co., stated that U. S. mines cannot at present produce sufficient lead to supply domestic needs, and predicted that a return to a free market would bring about a balance between production and consumption. He estimated annual requirements at 1,150,000 tons, of which scrap should furnish 350,000 tons. Domestic mine output of 387,000 tons in 1945 will not be repeated this year, because of strikes.

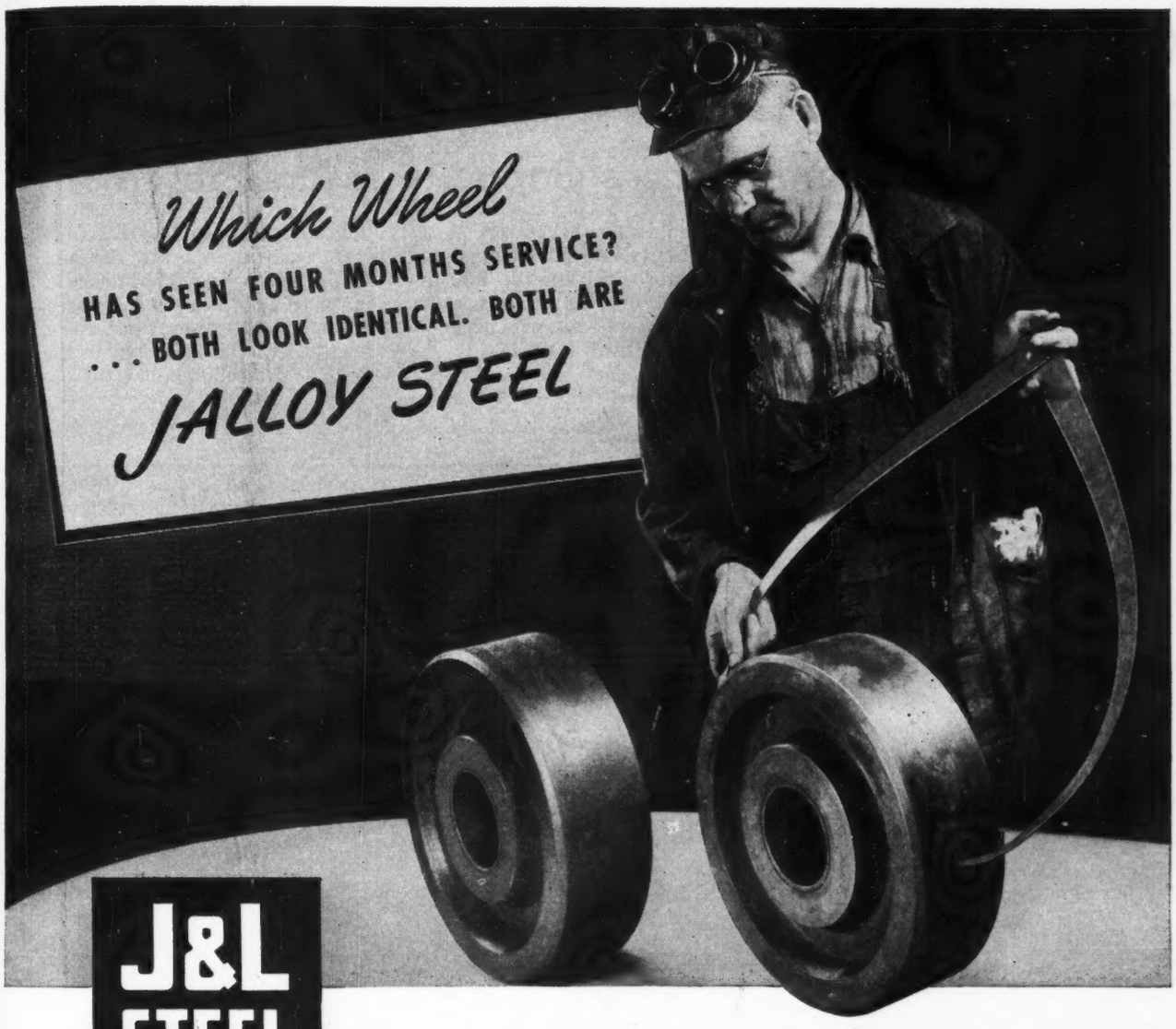
World production of lead in 1945, excluding Russia, was cited as 1,145,000 short tons. Under an agreement made with Great Britain in December 1945, lead cannot be bought outside the United States for 1946 delivery in excess of 130,000 tons. This figure is 200,000 tons less than 1945 imports and far short of the 450,000 tons of foreign lead needed. Lead production from countries now behind the "iron curtain," including Austria, Poland, Germany, Czechoslovakia, and Romania, is presumed to be going to Russia. No recent statistics are available from these countries which in 1937 produced 249,999 tons and consumed 433,290 tons.

Analyzing domestic production, Mr. Crane noted that lead use in 1945 totaled roughly 1,000,000 tons, of which 400,000 tons came from mine production, 300,000 tons from scrap, and the remainder from imports. Classed on a basis of shipments to consuming industries, 300,000 tons were used in storage batteries, compared with a seemingly minor consumption of 70,000 tons in oil refining and gasoline. Experience has shown, however, that in normal years 80 percent of the lead used in batteries finds its way back to smelters. The theoretical net consumption in batteries therefore amounted to only 60,000 tons. Total actual use of new lead in 1945 was about 650,000 tons.

The present U. S. ceiling price of 6½c, compared with a London price which has increased 165 percent since 1939 to a present level of 9.15c. (8.09c. plus emergency duty), was termed far out of line. An adverse effect of a low ceiling on any metal is to stimulate rather than curtail production of articles from the metal. Although lead is considered indispensable in automobile storage batteries, ammunition, incased cables, exterior paints, and bearing and type metals, there are many purposes for which it may be interchanged with copper, zinc, and aluminum. In a normal economy the price relationships of metals help to regulate the flow. Generally the domestic price ratio of copper to lead has been 2 to 1. The OPA ceilings established a 1.8 to 1 ratio, which has remained fixed while the London ratio, starting at 2.5 to 1, was realistically adjusted to a present basis of 1.6 to 1. A lead price equal to the present London quotation would permit lead to be used for all its essential purposes and to be displaced by copper, zinc, and aluminum where these metals are equally available and are not now used because of price.

Wartime demand has driven U. S. lead mines harder than mines elsewhere, Mr. Crane said, because the mines were nearest the market. He attributed the drop in production since 1937 to shortage of manpower and to the difficulty of maintaining essential development work. The peak production of the nineteen twenties is not

(*Continued on Page* 118)



One of the two wheels above was in use for four months on a charging machine where it was daily subjected to repeated loadings of 300,000 pounds. Previously, regular carbon steel wheels would mushroom and have to be taken out of service in two weeks, thus presenting an expensive maintenance problem involving three men to make the replacement. A heat treated wheel of Jalloy steel was substituted and after four months' service removed for inspection. It is the wheel on the right. No appreciable wear can be seen when compared to the wheel beside it that was never in service. If you have an application that requires resistance to abrasion, fatigue and high impact strength write to us about heat treated Jalloy.

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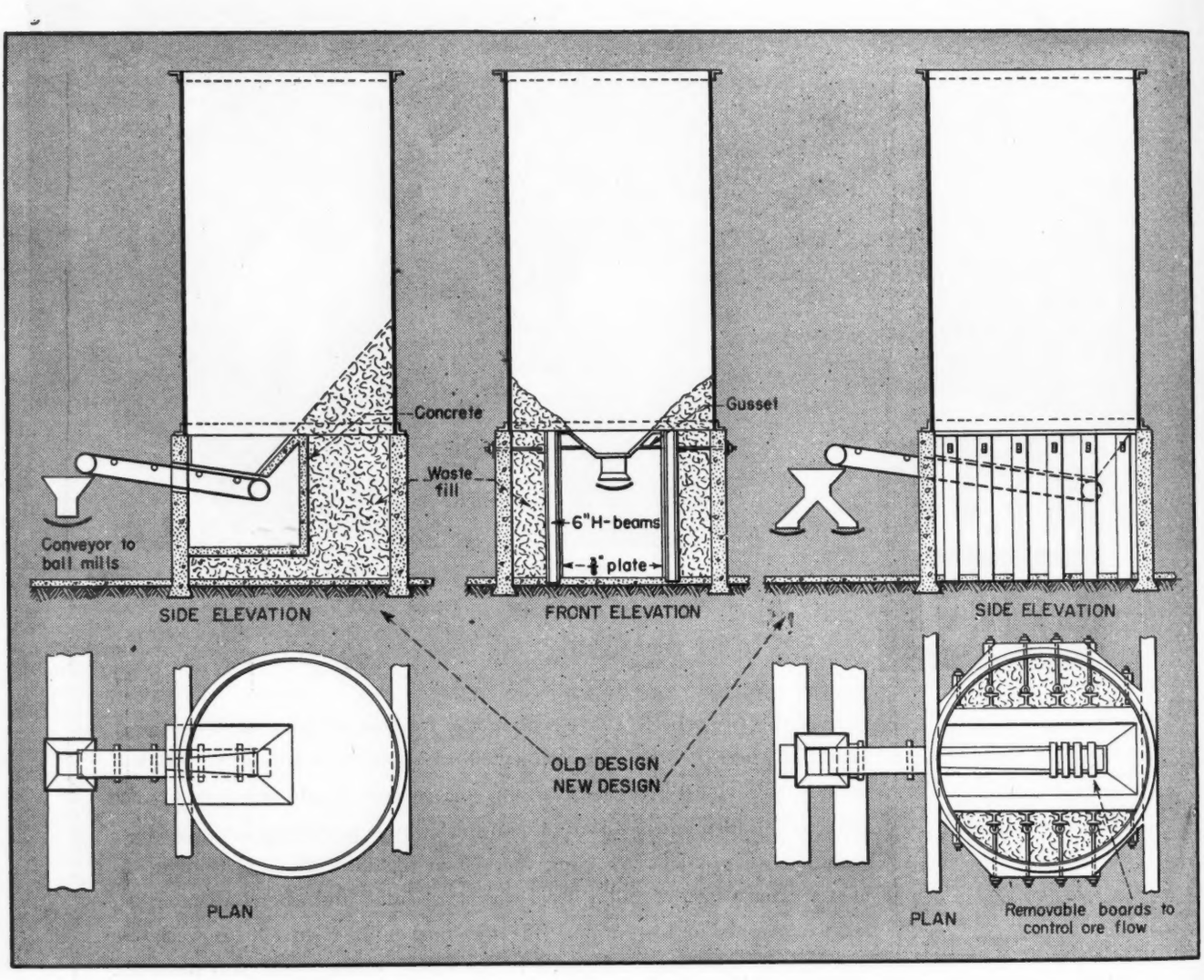
OPERATING IDEAS

Alteration Increases Capacity of Ore Bin

Bin capacity of the 500-ton ore bin at the head of the grinding section of the Combined Metals Reduction Co. concentrator at Pioche, Nev., has been increased from 50 to 75 tons, according to Max Kennard, plant engineer, by modifications here shown.

Because of the relatively short chute opening at the bottom of the original bin, waste fill occupied considerable space within the bin, and displaced an equal volume of ore. The old arrangement did not permit a steady withdrawal of ore.

A greater capacity and a smoother discharge were achieved by installing 6-in. H-beams within the concrete chamber beneath the bin, and facing these rows of beams with ⅜-in. plate held in place by gussets. As a result of the alterations made, full feed can now be directed to the ball mills no matter how low the ore level in the bin.



Concrete Lining Prevents Corrosion of Pipe

The presence of sulphur in mine water caused frequent replacements of pipe in the shaft discharge column at the Homer mine of the M. A. Hanna Co., Iron River, Mich. This problem has been solved by lining the 12-in. pipe with a ⅜-in. layer of rich concrete.

Two 12x16-in. mine timbers 30 ft. long are mounted on concrete bases. A 20-ft. length of 12-in. pipe is then placed on two pipe supports fitted with steel rollers to permit rotation of the pipe.

Grease is removed from the inside of the pipe by

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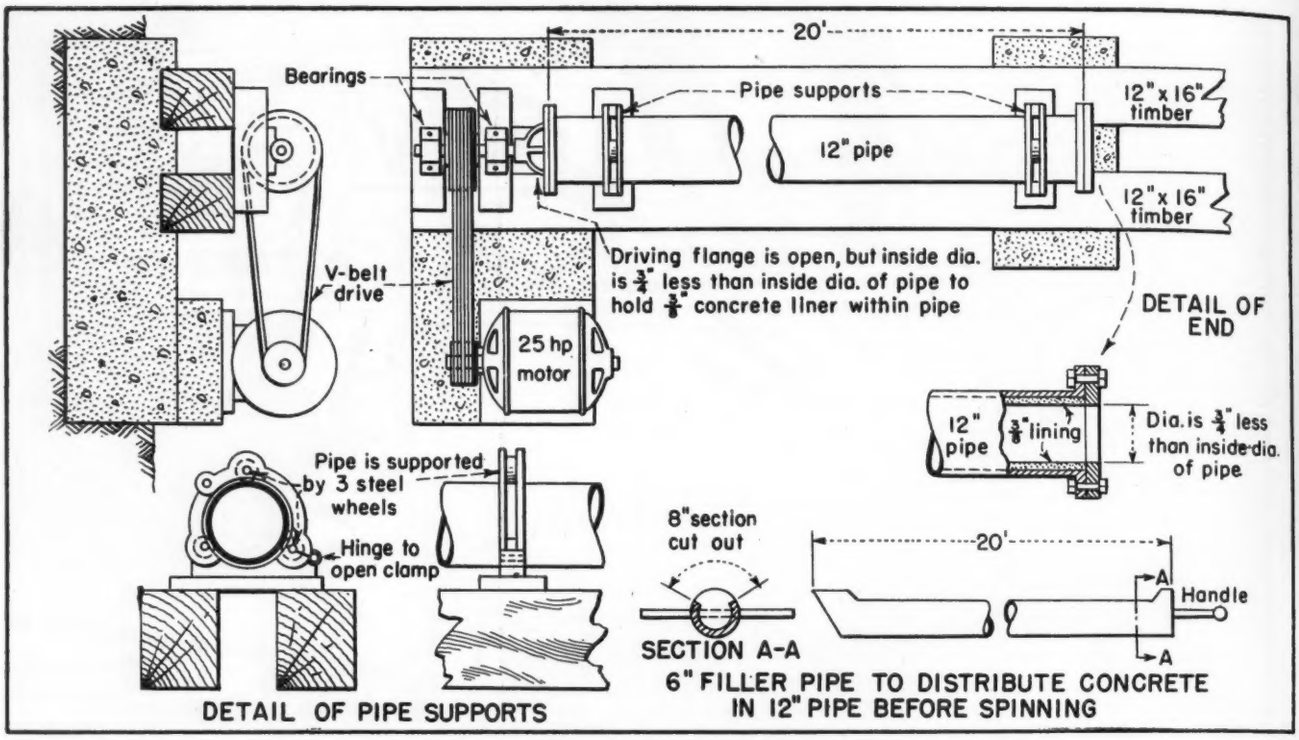
Carbon and Alloy Steels, Allegheny Stainless, Tool Steel, Bars, Plates, Sheets, Structurals, Mechanical Tubing, Inland 4-Way Floor Plate, Reinforcing Bars and Accessories, Boiler Tubes, Welding Rod, Babbitt, Bolts, Rivets, Metal Working Tools & Machinery, etc.

RYERSON STEEL

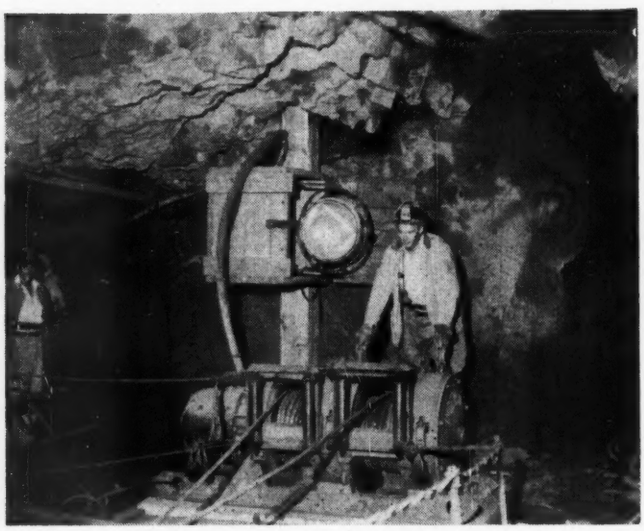

20'
Bearings
Pipe supports
12" x 16" timber
12" pipe
12" x 16" timber
Driving flange is open, but inside dia. is ¾" less than inside dia. of pipe to hold ⅜" concrete liner within pipe
V-belt drive
25 hp motor
DETAIL OF END
12" pipe
⅜" lining
Dia. is ¾" less than inside dia. of pipe
Pipe is supported by 3 steel wheels
Hinge to open clamp
8" section cut out
20'
A
Handle
A
SECTION A-A
DETAIL OF PIPE SUPPORTS
6" FILLER PIPE TO DISTRIBUTE CONCRETE IN 12" PIPE BEFORE SPINNING

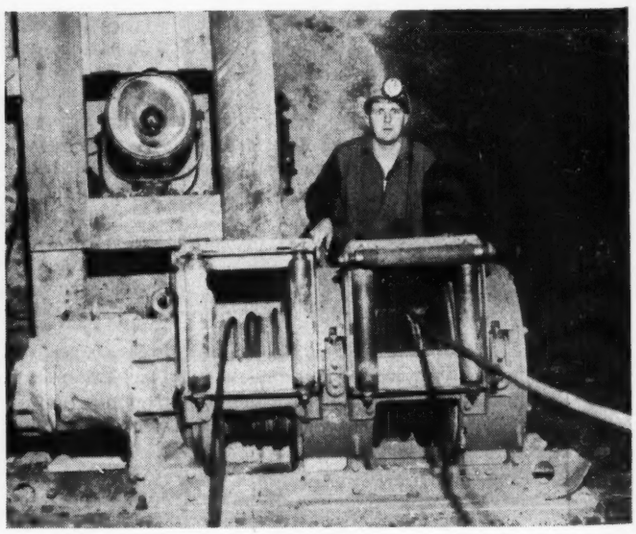
pouring kerosene into the pipe and rotating it for a short period. This is followed by a similar wash with an alkali solution to remove the kerosene. This cleans the steel sufficiently to permit a bond between the pipe and the concrete.

A carefully determined amount of concrete is poured in the 20-ft. length of 6-in. filler pipe, which is then inserted full length into a partly open end of the 12-in. pipe. A twist of the handle on the 6-in. pipe distributes the concrete uniformly along the entire length of the larger pipe.

Following removal of the filler pipe, the larger pipe is rotated at a speed of 900 r.p.m. Rotation squeezes water out of the concrete and causes the concrete to stick to the sides of the pipe. With this equipment, a length of pipe can be lined in one hour. One length of pipe, thus lined, showed no deterioration after a year's installation.

Floodlights Protected From Blast in Slusher Drifts





FLOODLIGHTS contribute appreciably to safety and efficient operation when installed in slusher drifts. However, during secondary blasting rock fragments may damage this equipment unless protection is provided. Two methods of guarding floodlights from damage are shown in the above illustrations submitted by Roger Pierce of the Ingersoll-Rand Co. In one type a sliding wooden door is dropped in front of the light during blasting, and in the other the whole light slides into a stout wooden box which is fitted with a hinged door as shown.

BASIC IN BETTER MINE SAFETY

LIGHT . . . WHERE LIGHT IS NEEDED

more brilliant
more effective
completely reliable

plus comfortable, safe head protection!

Light the way to safer production with Edison Electric Cap Lamps — sturdy, powerful, built for the most rugged mining service, furnishing high illumination better directed to the job!

Unfailingly dependable in operation, Edison Lamps enjoy top popularity in modern mining. When worn with M.S.A. Skullgards for all-around head safety, they supply the miner with personal protection that is continuously effective throughout every shift. *Demonstrations gladly arranged on request.*

EDISON
ELECTRIC CAP LAMPS

M·S·A
SKULLGARDS

MINE SAFETY APPLIANCES COMPANY
BRADDOCK, THOMAS and MEADE STREETS, PITTSBURGH 8, PA.
District Representatives in Principal Cities

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MINE SAFETY APPLIANCES COMPANY OF CANADA, LIMITED
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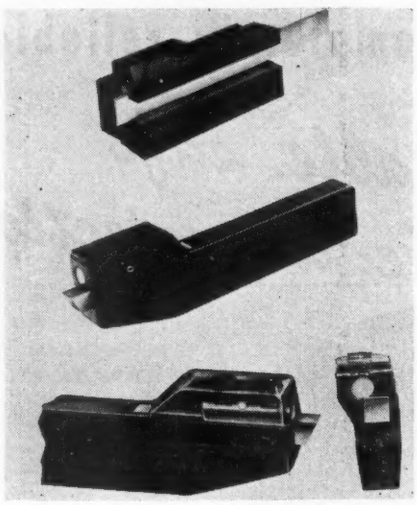
EQUIPMENT NEWS

Sturdy Tool Holders

A new line of drop-forged lathe turning and cut-off tool holders has been announced by Cooper-Bessemer Corporation, Mt. Vernon, Ohio. Shown at the top in the accompanying halftone, the cut-off tool holder is said to clamp the blade so securely that chatter is prevented, a shorter blade can be used, and precision work is facilitated. The



blade can be removed and replaced without changing the tool post adjustment.

The turning tool holders, shown in the other two views, offer the same feature of rigidity of grip and longer bit life. Bits are not mutilated by setscrew marks, and holder channel cannot wear concave. Heavier cuts can be taken. The tool can be removed for grinding without changing the tool post adjustment.

Heat for First Aid

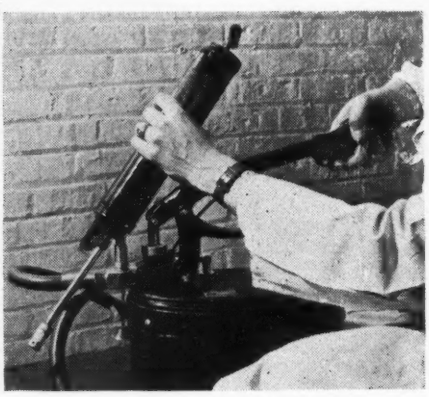
Rapid and safe emergency heat, suitable for treatment of shock in accident victims, is supplied by the Redi-Heat Block manufactured by Mine Safety Appliances Co., Pittsburgh 8, Pa. Built of light-weight metal, the block contains a heat charge that is activated by a lever, thereby initiating a chemical reaction that evolves a safe dry heat for an hour. The block measures 3½x 4x1½ in., and can be stored indefinitely.

Air Hose Check Valve

If an air hose breaks or works loose while under pressure, the wildly whipping end is a source of considerable danger until it can be corralled or the air shut off. To eliminate this hazard, E. D. Bullard Co., 275 Eighth St., San Francisco, Calif., is distributing the Numatic Safety Check, manufactured by Hackett Mfg. Co., Oakland, Calif. The device is simply a check valve that is activated by excessive flows in the air line, and when a break occurs the valve shuts off the air instantly. In addition to this safety feature, the valve is useful in that it makes unnecessary the practice of crimping a hose to shut off the air when a tool is changed. With the Numatic check, the hose can be removed, and the valve will shut off the air. The unit is made for working pressures up to 250 lb. and in standard ½-in. and ¾-in. sizes.

Loading Grease Guns

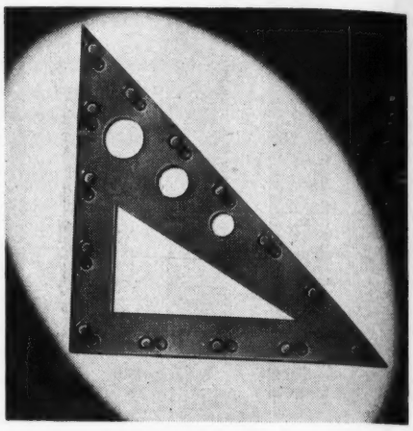
Loading of hand grease guns is said to be easier with a device recently announced by Alemite Division of Stewart-Warner Corporation, Chicago, Ill. By means of a gun-loader fitting mounted on the head of the grease gun,



a full charge of grease can be shot into the gun in the same way that grease is later charged into the bearing to be lubricated. New guns manufactured by Alemite are fitted with this attachment, but guns already in the field can be converted if desired. When writing for information, give the model number of your equipment.

Aids to Draftsmen

Shown in the accompanying illustration is a new "floating" triangle, one of the varieties now being made by Instrumaster Industries, Inc., Greenwich, Conn. Feature of the triangle is the provision of embossed buttons that raise the lower surface of the triangle about 0.02 in. above the paper. This device is said to provide a better inking edge, provide easier handling, minimize smudging, and eliminate frequent shifting of triangles, inasmuch as each triangle has within it an opening cut to the opposite shape, 30 to 60 deg. in the one shown. The company also manufactures stencils that greatly simplify



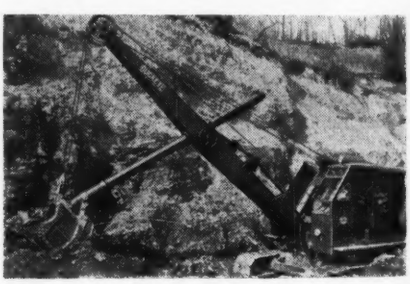
the making of three-dimensional drawings. Write to the company at 7340 Arch St., Greenwich, Conn., for full information.

Welded Screw Conveyor

Screw conveyor blades formed from a single ribbon of carbon, stainless, or other alloy-steel are offered by Lee Spring Co., Inc., 30 Main St., Brooklyn 1, N. Y. To fabricate the conveyor, the ribbon is simply welded to a shaft, a method which results in certain economies, according to the manufacturer.

High-Lift Shovel

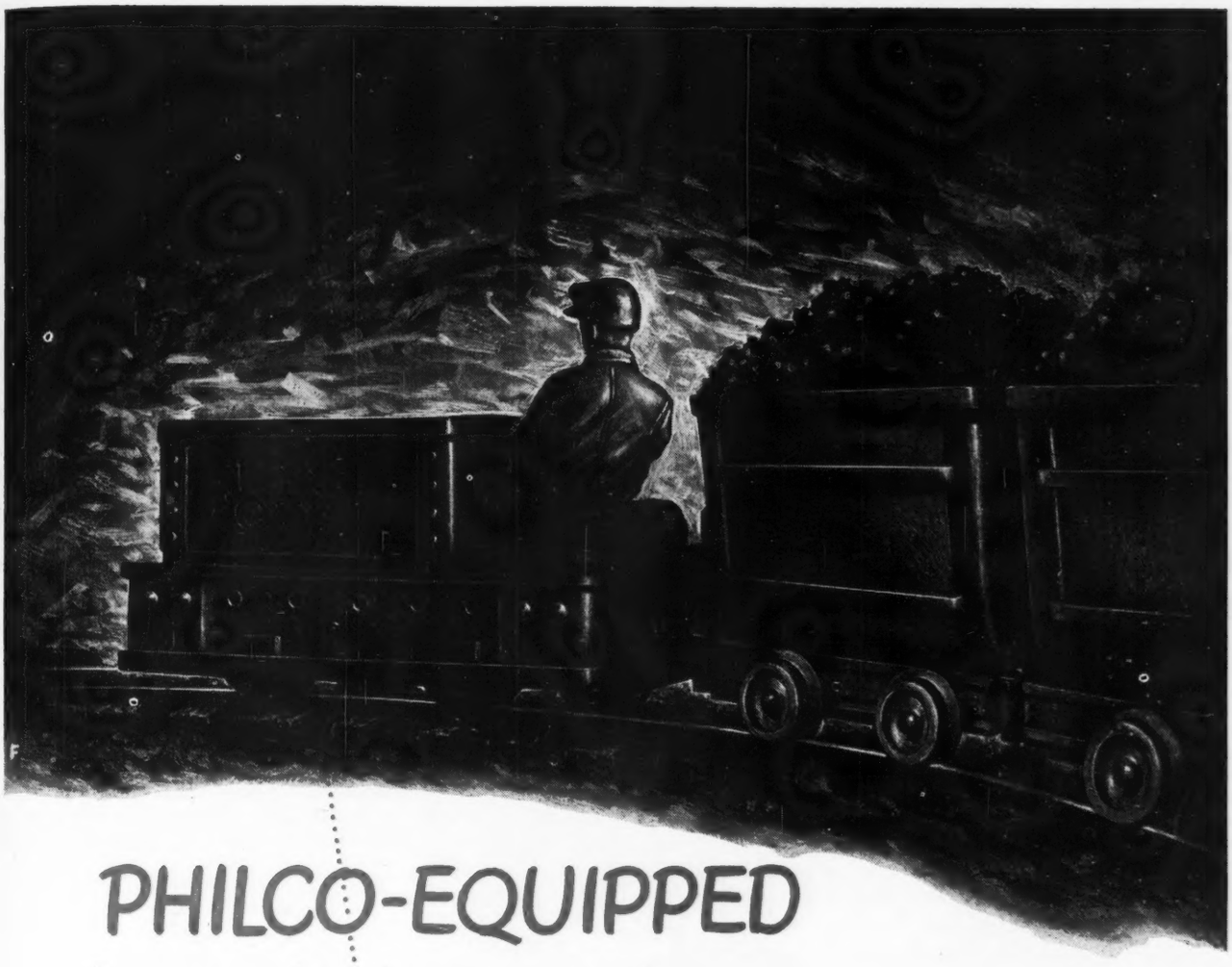
Buckeye Traction Ditcher Co., Findlay, Ohio, announces that its Model 70 Clipper ¾-cu.yd. shovel will be available with a boom 4 ft. longer and a dipper stick 3 ft. longer than former models. The resulting high lift, it is claimed, provides deeper digging,



higher dumping, and greater digging radius than in other models. Long crawlers and wide treads are said to provide sure footing and stability. Vacuum power controls are used.

Sand and Gravel Pump

Constructed of steel with heavy rubber or steel liners and with flexible blades, the line of Wallberg pumps is said to offer certain advantages in



PHILCO-EQUIPPED

Lowers haulage costs!

Today, in many mines, the spotlight is on new cost-saving developments in mine haulage. In batteries, for example, the talk of the Industry is the new Philco "Thirty", with 30% longer life! Already, Philco "Thirty" has proved its capacity for hard work, and its lower cost per ton hauled. Many operators are now specifying Philco "Thirty" for replacements as well as initial equipment. Write for specification data. PHILCO CORPORATION, Storage Battery Division, Trenton 7, New Jersey.

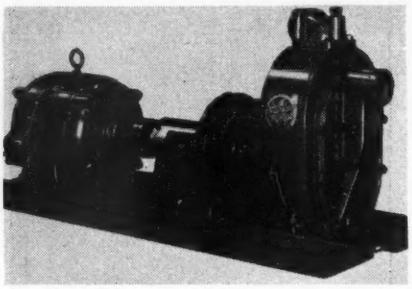
PHILCO

FOR FIFTY YEARS A LEADER IN INDUSTRIAL STORAGE BATTERY DEVELOPMENT

pumping slurries or sludges containing gravel. Built with suction diameters of 1 in. to 30 in. in size, the pumps are said to be capable of handling solids up to three-quarters of their suction diameter in size. For full details, write to Wallberg Pump Co., Inc., 116 New Montgomery St., San Francisco 5, Calif.

Mine Gathering Pump

Self-priming centrifugal pumps for mine gathering service, which usually involves pumping along one level to a central station, are now offered in an improved version by Marlow Pumps, Ridgewood, N. J. Self-priming on suc-



tion lifts as high as 25 ft., the pump is said to make use of several features that make for ease of operation and maintenance. It is available in 2-in. and 3-in. sizes with 2-hp. and 3-hp. motors. Corrosion-resistant models are manufactured.

Steel Filter Medium

Commercially available for the first time, a stainless-steel filter medium is now offered by Micro Metallic Co., 99-16 Metropolitan Ave., Forest Hills, N. Y. The medium is a strong, porous, ductile structure made from stainless steel powder welded at the points of grain contact. Fabricated as a thin sheet, the medium can be bent about a small radius, and it can be used in nearly all types of conventional filters. A range of pore openings can be supplied, as desired, running from 4 to 165 microns.

Flexible Tubing Coupling

Simplified joining and disconnecting of flexible ventilation tubing has been developed for Spiratube, the non-collapsible, retractible tubing made by Warner Brothers Co., Spiratube Division, Bridgeport 1, Conn. The coupling, a flat steel collar, is built into the

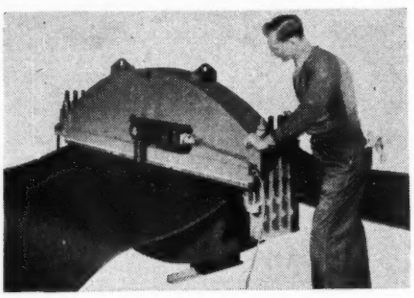
tubing and can be compressed to slip inside the end of another section. Diameters of the tubing run from 3 in. to 16 in., and lengths of 10, 15, and 25 ft. are furnished.

Tractor Loader

Extremely high lift and long reach have been built into the new Drott Hi-Lift loader, recently announced by Drott Manufacturing Corporation, Milwaukee 9, Wis. Designed for mounting on Oliver Cletrac tractors, the loader is used in a variety of operations involving materials handling. With a bucket of 1¼ cu.yd., which is hydraulically operated, the loader can achieve a lift of 10 ft. 8 in., and dump about 5 ft. ahead of the radiator. A light-material bucket of 1¾ cu.yd. is available for use with coal.

Largest Belt Vulcanizer

James C. Heintz & Co., Cleveland, Ohio, recently completed what is regarded as the largest belt vulcanizer in the world. Made for the Frick Coal Co., Uniontown, Pa., the vulcanizer can join smoothly the ends of belts up to 6 ft. in width and of any thickness. The company is one of the largest users



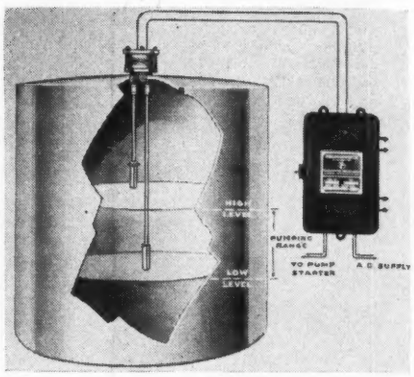
of rubber conveyor belts in the world, and the new vulcanizer will be used in repairing or splicing the many miles of conveyor belts now in operation there. The Heintz Co. also offers belt vulcanizers ranging in size from 6 in. to 5 ft.

Community Water Supply

The entire water supply for a mining village is being met by use of a new ion-exchange system worked out by American Cyanamid & Chemical Corporation, 30 Rockefeller Plaza, New York 20, N. Y. In a region where the only water available is hard and salty, the Filt-R-Still system supplies 9,000 gallons of potable water in a 9-hr. operating day at a cost for chemicals of about $400 per month. Taste of the resulting water is pleasant, and it is also soft and suitable for all domestic uses.

Liquid Level Control

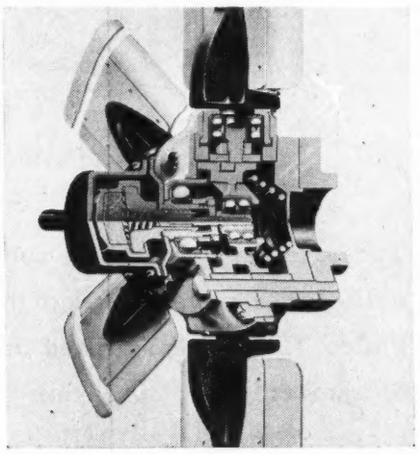
Level of any electrically conductive liquid within a tank can readily be controlled by means of the Photoswitch level control, Series 10, recently an-



nounced by Photoswitch, Inc., Broadway and 6th St., Cambridge 42, Mass. Mica-insulated stainless-steel probe rods are used, and no electrolytic action occurs if a.c. is applied to the rods. Without use of vacuum tubes, the probe circuit controls a relay that can be made to actuate signals, valves, or pumps.

Thermal-Controlled Fan

Designed for use on heavy-duty trucks, locomotives, generators, power shovels, tractors, power-supply units, and similar installations of gasoline or diesel engines, a new model of the Evans Thermo-Control fan has been announced by Thermo-Aire Division of Evans Products Co., Detroit, Mich. The



fan adjusts itself by changing blade pitch to changes in engine and ambient temperatures, and thus helps maintain even operating temperatures. Installation of the new model is said to have been simplified.

Toxic Gas Detector

An automatic toxic gas detector, suitable for use in factory or laboratory, has been designed by Dr. John H. Northrop for the Office of Scientific Research and Development. Held confidential until recently, the device is now described in pamphlet PB-4210, obtainable for $1 from the Office of Publication Board, Department of Commerce, Washington, D. C. The unit consists of a cell containing silver ions through

which samples of the gas are bubbled. If a reaction occurs, as with a toxic gas, the cell potential changes and a warning circuit is activated.

INDUSTRIAL NOTES

Thomas H. Fawcett has been appointed sales engineer of the locomotive division of Vulcan Iron Works, Wilkes-Barre, Pa.

R. G. LeTourneau, Inc., Peoria, Ill., announces the appointment of **Stanley D. Means** to the newly created post of domestic sales manager.

The Le Roi Co., Milwaukee, Wis., announces formation of a new manufacturing unit to be known as the Cleveland Division of the company. **Russell R. Morgan**, a former officer of Cleveland Rock Drill Co., heads the Cleveland Division.

Alaska Drilling Co., Juneau, Alaska, announces that it can offer all forms of drilling service, including contract bit setting. **Walford A. Peterson** heads the organization.

B. P. Spann has returned as advertising manager for **Gardner-Denver Co.**, Quincy, Ill., after more than three years' service in the Navy.

R. G. LeTourneau, Inc., Peoria, Ill., was recently named a winner in the machinery and equipment division of the Fourth annual advertising competition of the Associated Business Papers. The company also announces the appointment of **Oscar W. Nelson** as vice president and general manager of its Peoria plant.

C. M. Christensen has been appointed special mining representative in the Rocky Mountain area for **B. F. Goodrich Co. John S. Gulledge** has been named acting Denver district manager, replacing Mr. Christensen.

Wheat Lamp Sales, Inc., announces expansion of its operations to include the states of Illinois and Indiana.

BULLETINS

Filters. A 4-page bulletin describing the Conkey rotary disc vacuum filter and its application in industry is offered by General American Transportation Corporation, 420 Lexington Ave., New York 17, N. Y.

Diesel Engines. The Buda Co., Harvey, Ill., has recently published a 12-page catalog on its new line of Series 161 engines for automotive, marine, and industrial service. Power range is from 15 to 300 hp.

Wire Rope Clips. American Hoist & Derrick Co., St. Paul, Minn., has prepared a pocket-size information card on the use of Crosby wire rope clips.

Mine Jacks. The new 64-page catalog describing Simplex lever, screw, and hydraulic mine jacks has been prepared by Templeton, Kenly & Co., 1020 South Central Ave., Chicago 44, Ill.

Electronics. Westinghouse Electric Corporation has prepared a "Business Man's Guide to Electronics," which may be obtained by writing for booklet A-4726 to Westinghouse Lamp Division, Electronic Tube Sales Dept., Bloomfield, N. J.

Rail Cars. Passenger cars for use on rails are described in a new publication of the Buda Co., Harvey, Ill. Seating capacities range from 6 to 64 passengers.

Diamond Bits. Christensen Diamond Products Co., Salt Lake City, Utah, has prepared a bulletin describing its Duralite diamond bits. Design and constructional features are given.

There's a

SCHRAMM

AIR COMPRESSOR

. . . for your every need!

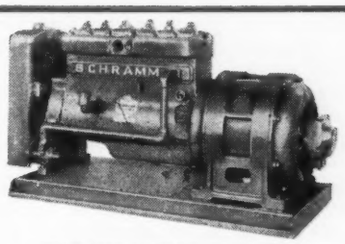
SIZES RANGING FROM 2 TO 600 CU. FT. DISPLACEMENT

DIRECT DRIVE ON BASE

Built-in Motor Drive mounted on steel base is compact and easy to install. No foundations necessary.

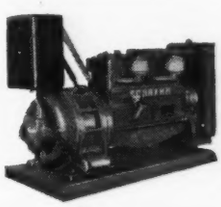
WITH "V" GROOVE PULLEY

Schramm Belt Driven Compressors can be obtained with "V" or flat belt drive suitable for twenty-four hour service and economical operation.



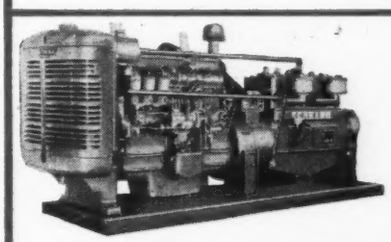
DIRECT MOTOR DRIVE WITH COOLING UNIT

Schramm 300 cu. ft. displacement with direct-connected 50 H.P. motor with cooling unit on Steel Deck Base.



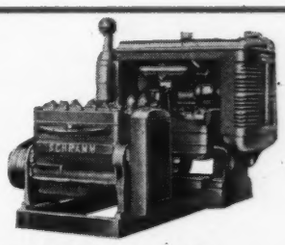
DIRECT DRIVE WITH STARTER AND RADIATOR

Both compressor and motor are mounted as a single unit on a substantial steel base with starter, radiator, and cooling unit.



DIESEL ENGINE DRIVE-IN LINE

Complete self-aligned, direct connected Diesel Engine Driven Compressor for semi-portable or stationary installation.



BELT DRIVE ON BASE WITH ENGINE

Schramm Engine Belt Drive on Base combinations are available for applications not reached by electric power service in mill, mine, and other industrial plants.

SCHRAMM INC.

COMPRESSOR SPECIALISTS

WEST CHESTER

PENNSYLVANIA

NEW BOOKS

MINERALS YEARBOOK, 1944 EDITION. U. S. Department of Interior, Bureau of Mines. May be purchased only from Superintendent of Documents, Government Printing Office, Washington 25, D. C. Pp. 1636. Price $3. Separate chapters including those of metals, non-metals, and state or regional production may be obtained at a price ranging from 5c. to 15c.

As in previous years, the 1944 Yearbook, prepared by the Economics and Statistics Branch of the Bureau, is an excellent and authoritative report on the production, distribution, and consumption of minerals in the United States. After three years as a confidential volume, the Yearbook returns to its prewar status with the 1944 edition, and is again available for public distribution.

The subject of foreign mineral trade has been brought up to date for the first time in five years in a special section, Foreign Minerals Review, which is introduced as a permanent feature of the Yearbook. Production in Latin American countries receives special emphasis.

GRAPHICAL SYMBOLS FOR ELECTRIC POWER AND CONTROL. American Standards Association, 70 East 45th St., New York. Pp. 36. Price 40c.

This publication of the ASA presents the new American Standard sponsored by A.I.E.E. and the A.S.M.E. and approved by the American Standards Association on March 1, 1946. It is now available for general distribution. In it are given only basic symbols (with few exceptions) which have wide-spread use and application. Though these do not cover all symbols, the variations can be accommodated by following the basic symbols. Preference has been accorded to symbols that are simple in design and easy to produce.

PAST CONSUMPTION AND FUTURE (1950) REQUIREMENTS OF POTASH SALTS IN AMERICAN AGRICULTURE. By J. W. Turrentine. Published by American Potash Institute, Washington, D. C. Pp. 31.

This report is the last of a series of three on aspects of the potash situation that has been sponsored by the American Potash Institute, of which Dr. Turrentine is president. The other two, made by Samuel H. Dolbear and Jules Backman respectively, were noted in the May issue of *E.&M.J.* Dr. Turrentine shows that consumption of potash for agricultural purposes in the United States (Puerto Rico and Hawaii are included) has risen from 100,000 tons K_2O in 1905 to 393,000 tons in 1938 and to 642,000 tons in 1944. The estimate for 1945 is 740,000 tons K_2O.

Postwar potash requirements in agriculture as of 1950 are estimated at 612,000 tons K_2O, with full employment, and at 445,000 tons K_2O with some unemployment. The requirements of the chemical industries as of 1945 are correspondingly put at 50,000 tons K_2O with full employment and at 40,000 tons with some unemployment.

Supplies as of 1950 for domestic agriculture and chemical industries combined, including production and imports, are estimated at 1,178,000 tons K_2O with full employment and at 1,072,000 tons K_2O with some unemployment. The latter figures are based on a domestic production rate of 875,000 tons K_2O, a decline in chemical usage, and imports from Europe as estimated by the U. S. Tariff Commission.

Subtracting the requirements for agicultural and chemical purposes from supplies as given in the foregoing, it is seen that there will be a surplus in 1950 amounting to 516,000 tons K_2O with full employment or 587,000 tons K_2O with some unemployment. With imports of the magnitude predicted by the Tariff Commission, and to avoid these surpluses, domestic production would have to be reduced to 359,000 tons K_2O with full employment or 288,000 tons with some unemployment.

At such production rates, Dr. Turrentine finds, American potash reserves of 357,000,000 tons K_2O in the form of water-soluble materials would last for 1,000 years. At a production rate of 875,000 tons K_2O it would last for 400 years.

ALUMINUM AND MAGNESIUM FABRICATION AT LEIPZIGER-LEICHTMETALL - WERK, RACKWITZ-LEIPZIG, SAXONY, GERMANY. No. PB-1832, Pp. 17. Price: photostat, $2; microfilm, $0.50.

EXTRACTION OF ALUMINA FROM CLAY BY HYDROCHLORIC ACID PROCESSES. No. PB-13983, Part I. Pp. 78. Price: photostat, $6; microfilm, $1. No. PB-13984, Part II. Pp. 41. Price: photostat, $3; microfilm, $0.50.

The foregoing publications can be ordered from Department of Commerce, Office of Publications Board, Washington 25, D. C. Make check or money order payable to Treasurer of United States.

The German process described in the first involves reduction of Al_2O_3 at high temperatures in a revolving furnace, using coal dust as the reducing agent. Centrifugal force drives the molten bath high on the sides of the furnace and thus protects the brick furnace lining. Ends of the furnace are water-cooled.

The second paper, in two parts, describes, first, certain experiments on extraction of alumina that were conducted in cooperation with the War Metallurgy Committee. The process consists of calcining clay to render the aluminum silicate soluble in HCl, and recovering the alumium chloride by evaporation. These crystals are then calcined, which produces a crude alumina, 90 percent pure, for purification by the Bayer process.

Part II describes tests on an HCl gas precipitation process that was not found suitable for large-scale use.

PUBLICATIONS RECEIVED

Quebec. The Department of Mines has issued the following bulletin, by W. N. Ingham: "Mining Properties and Develpment in Abitibi and Temiscamingue Counties During 1944." It is in three parts, of 74, 60, and 62 pages respectively.

Geological Map of Teck Township, Ontario. Map No. 1945-I on scale of 1 in. to 1,000 ft. Department of Mines, Toronto, Ont.

"Methods Quimicos Para la Determinacion de los Elementos Minerals." Issued by Secretary of National Economy. Mexico, D. F. P. 16.

Manganese Deposits Near Teloloapan and Arcelia, Guerrero." A 3-page article (in Spanish) by Ing. Jenaro Gonzáles Reina, in the March 1946 issue of the Boletin de Mines y Petroleo, published by the Secretary of National Economy, Mexico, D. F.

Transvaal. Reports of Executive Committee, Transvaal Chamber of Mines, Gold Producers' Committee and Collieries Committee for 1945. Johannesburg. Pp. 37.

Tangsten. "Pine Creek and Adamson Tungsten Mines, Inyo County, Calif." By P. C. Bateman, of U. S. Geological Survey, An article in the California *Journal of Mines and Geology* for October 1945, Division of Mines, San Francisco. Pp. 19.

Ontario. "Geology of Robb-Jamieson Area" and "Some Copper Properties in Robb, Jamieson, and Godfrey Townships." Ontario Department of Mines, Toronto. Pp. 32, plus map.

(*Continued on page* 117)

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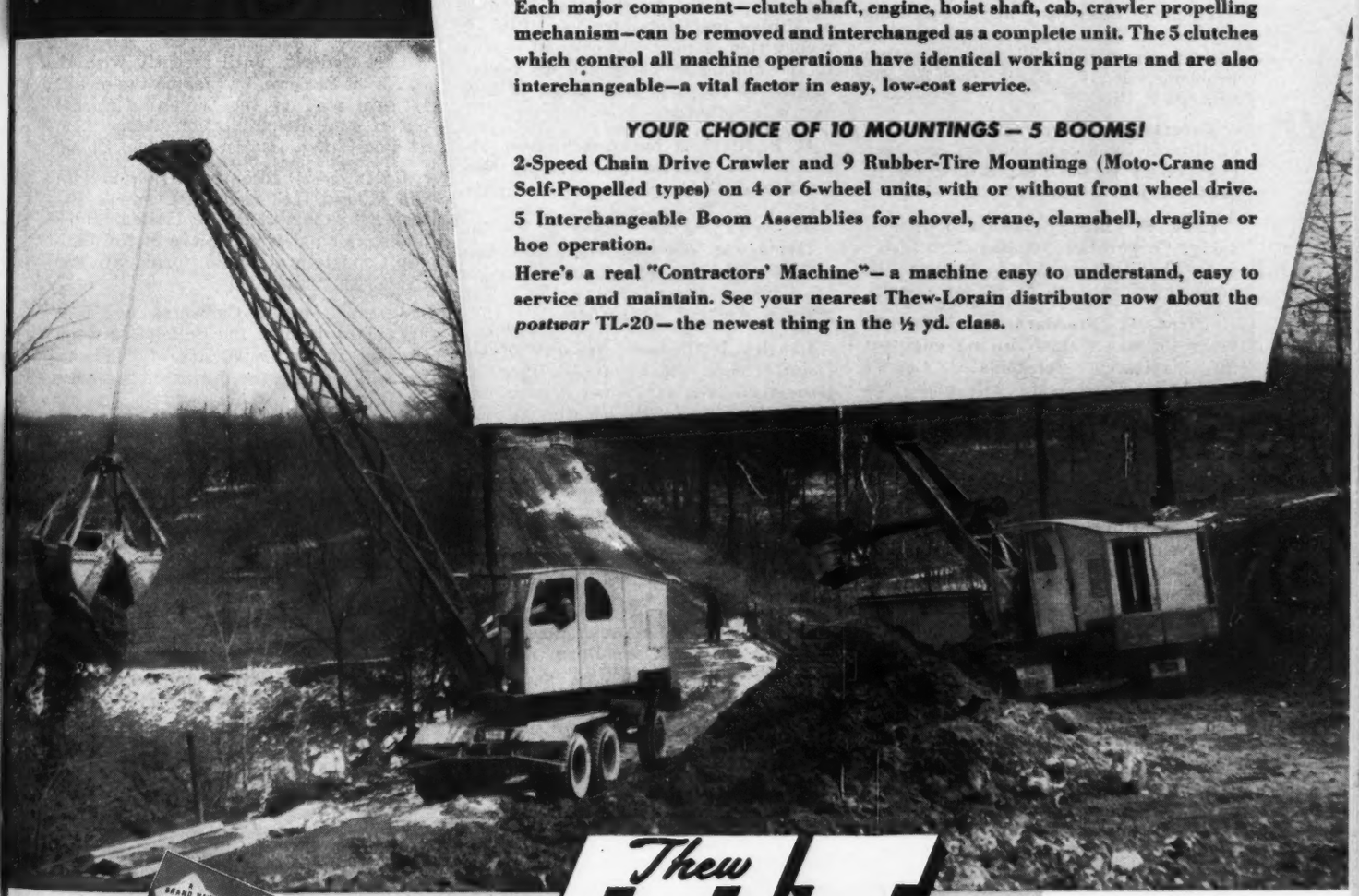

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Available with 5 Interchangeable Booms and Choice of 10 Mountings

PERSONAL NEWS

John Croston, who has just returned from the Netherlands Indies, Malaya, and Siam, where he has been observing conditions for the RFC, has been appointed deputy director of the metals and minerals division of the CPA.

A. D. Hahn, formerly professor of mining at the New Mexico School of Mines and director of the New Mexico Bureau of Mines and Mineral Resources, has joined with **E. A. Goff, Jr.,** well-known mining engineer from California and the Mesabi Range in Minnesota, in opening up the Forest Queen group of mines at Irwin, near Crested Butte, Colo. They are installing a 25-ton flotation mill on the property.

Jay J. Seaver announces the establishment of consulting and engineering services on iron and steel production, including raw materials and operating problems, at 100 North LaSalle St., Chicago 2, Ill.

Robert Reynolds, recently of the staff of Illinois Geological Survey, has been engaged by Inland Lead & Zinc Co. as engineer and geologist.

Louis S. Cates, president of Phelps Dodge Corporation, on May 22 received from the University of Arizona the honorary degree of doctor of science.

Alfred C. Stoddard, who for 34 years has been chief mining engineer for Inspiration Consolidated Copper Co., has retired. He will make his home in Miami, Ariz.

Major Richard C. Ragle, U. S. Air Force, has been appointed assistant professor of geology and metallurgy at the University of Alaska. Major Ragle is returning to the faculty after four years of army service in Alaska and the States.

Al Anderson, secretary of the Alaska Miners Association, has returned to Fairbanks from his winter headquarters in Seattle.

Lawrence A. Dahners has replaced **Leo Saarela** as manager of the Territorial Assay Office at Anchorage. Mr. Dahners has been with the U. S. Bureau of Mines during the war and previously worked in Alaska. Mr. Saarela resigned to start placer mining near Rampart.

Douglas Colp has been appointed engineer for the South Fork Mining Co., with placer operations on the Koyukuk River north of Fairbanks. Colp was formerly employed at Caribou Creek and is a graduate of the University of Alaska.

Dr. D. E. Thomas, senior field geologist, has been appointed chief geologist in the Department of Mines, Victoria, Australia, in succession to **J. P. L. Kenny,** who has retired.

Frank R. Hockey, general superintendent of mines and quarries, Broken Hill Proprietary Co., Ltd., has been elected a vice president of the Australasian Institute of Mining and Metallurgy.

K. S. Blaskett has been appointed officer in charge of ore dressing research for the Council for Scientific and Industrial Research at the University of Melbourne.

Andrew Fairweather, formerly general manager and now a director of Broken Hill South, Ltd., Broken Hill, New South Wales, has been awarded the medal of the Australasian Institute of Mining and Metallurgy for 1945, in recognition of long and efficient service to the mining industry and his contributions to the industrial phase of Broken Hill operations.

C. E. Blackett has retired from the position of general manager of New Occidental Gold Mines, N. L., Cobar, New South Wales, and will engage in consulting practice. Prior to his appointment at New Occidental, ten years ago, Mr. Blackett was general manager of Boulder Perseverance, Ltd., Kalgoorlie, Western Australia.

Charles J. Haslam, manager of the Duluth sales office of Du Pont de Nemours & Co. explosives department, retired on May 1. He is to be succeeded by **W. W. J. Croze, Jr.,** who has been assistant manager.

T. L. Chapman, until recently of the staff of the U. S. Bureau of Mines at Tucson, Ariz., has assumed charge of the mining and milling operations of the Tennessee Schuylkill property at Chloride, Ariz.

D. E. Thomas has been made chief geologist to the Mines Department of Victoria, Australia, succeeding **J. P. L. Kenny,** retired.

David Dowie, who for more than five years had been serving in Australia's armed forces, has been made chief engineer for Bewick Moreing & Co. in London.

R. W. Fletcher, consulting geologist, has been made director of Kalgoorlie School of Mines, Western Australia.

W. A. Coster is at Mariaweg 68, Oosterbeek, Holland. During most of the Nazi occupation of Holland he was employed, forcibly, in the Billiton company's tin smelter at Arnhem.

Russell L. Richards, with A. S. & R.'s Neptune Gold Mining Co. subsidiary at Bonanza, Bolivia, as assistant manager, for ten years, recently resigned and returned to the United States. He may be addressed at 934 Lincoln St., Salt Lake City, Utah.

Joseph L. George has joined the staff of Empresa Minera Porco, as manager of the company's tin and antimony properties in the Potosi district of Bolivia.

Pitt W. Hyde, recently chief engineer for examinations for the New York Honduras Rosario Mining Co., has joined the staff of Cia Aurifera Nacional, Desmonte, Depto. de Alajuela, Costa Rica.

Ralph C. McQuire has succeeded **Herbert W. Walker** as superintendent of the Port Colborne refinery of International Nickel Company of Canada, Mr. Walker having retired after 27 years of service with the company.

Carl Goderez. until recently with U. S. Naval Reserve, has joined the metallurgical staff of the Chinese National Relief and Rehabilitation Association at Pao-Ching, Hunan Province, China.

Guido Bosio, recently in Bolivia with Cia Minera Unificada del Cerro de Potosi, has returned to the United States and may be addressed care of the Chilean Consulate at 24 California St., San Francisco, Calif.

James Rowland Cudworth has been appointed dean of the College of Engineering of the University of Alabama. He will assume the duties of the office on July 1.

Roger I. C. Manning, Arizona mining man and consultant, has been made field engineer for the Arizona Department of Mineral Resources, succeeding **George A. Ballam.**

Hueson J. Palmer, on the staff of Consolidated Mining & Smelting Co. at Trail, B. C., for 30 years, has retired.

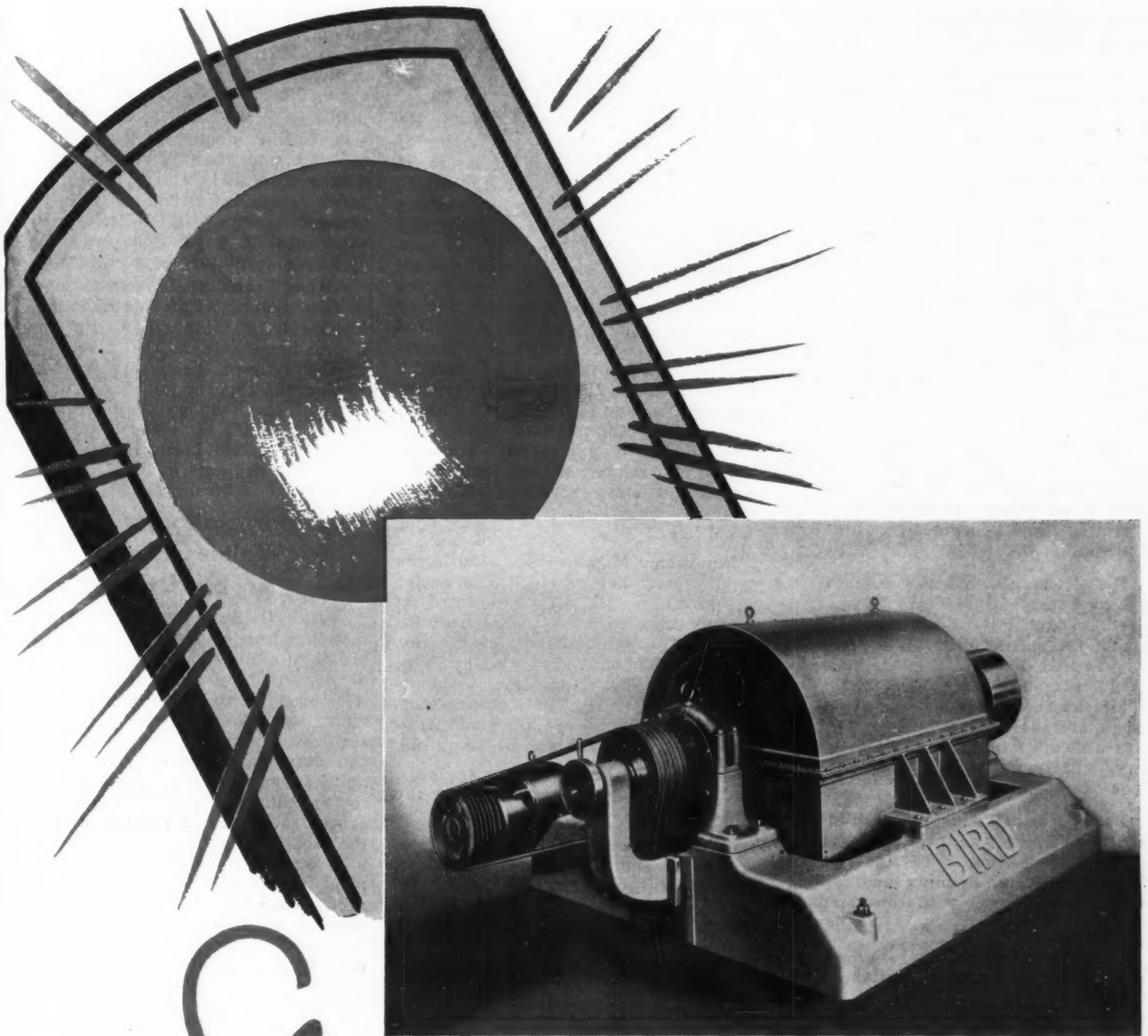
Dr. A. R. Clark and **Dr. Gordon P. Crombie** have been appointed to the staff of Mining Geophysics Corporation, Ltd. Both have had extensive experience in geophysical survey work in Canada.

Russell B. Paul, mining engineer of the staff of New Jersey Zinc Co., was recently elected president of the Mining Club, in New York.

Meredith E. Johnson, State Geologist of New Jersey, has been elected president of the Association of American State Geologists.

William D. Stone, until recently of the executive staff of Utah Magnesium Corporation, is now general superintendent of Arctic Circle Exploration Candle, Alaska.

Robert A. Willoughby, now on inactive service with the Navy, has gone to the Philippines to join the Philippine



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American Corporation's exploration and development staff.

W. W. Bradley, State Mineralogist, State Division of Mines, Ferry Building, San Francisco, Calif., has announced his retirement from office on Aug. 1 after 35 years of continuous service. Mr. Bradley was appointed chief of the Division in August 1928, and is the only man in the Division's 66 years' history to be promoted to chief from the staff.

Alfred L. Ransome, supervising engineer, San Francisco office U. S. Bureau of Mines, Metal Economics Division, reports that office quarters are now in the old U. S. Mint Building, Fifth and Mission Sts., San Francisco, Calif.

Jack McLaughlin, who for the past three years had been in Colombia, South America, recently returned to reenter the employ of the Yukon Consolidated Gold Corporation, Ltd., at Dawson, Y. T.

Dr. George W. White, professor of geology at the Ohio State University, has been appointed State Geologist of Ohio. He succeeds **Dr. Wilber Stout,** who retired May 1 after serving eighteen years as State Geologist. Dr. White has been at Ohio State University since 1941. From 1926 to 1941 he was a member of the staff of the geology department of the University of New Hampshire.

Frank B. Wichman, well-known Western mining engineer, has retired from his position with the United States Smelting, Refining and Mining Co. Wichman was with the company for over 25 years.

Ralph Gotland is now stationed in Helena, Mont., with the Montana Division of the U. S. Bureau of Mines. Gotland, formerly stationed at the Moscow, Idaho, office, was recently discharged from the United States Navy.

Arthur Notman, recently elected a director of Magma Copper Co., visited the Magma mine at Superior, Ariz., in April.

Robert McLellan has been appointed mine manager by Hedley Amalgamated Gold Mines, Ltd.

J. Y. Murdoch, president of Noranda Mines, Ltd., and **G. H. Rainville,** president of Quebec Gold Mining Corporation, have been elected to the board of directors of Cariboo Gold Quartz Mining Co., Ltd.

Dr. W. E. Cockfield has been elected a vice president of the Canadian Institute of Mining and Metallurgy.

H. C. Giegerich has been appointed general superintendent of all Consolidated M. & S. operations in the Northwest Territories and northern parts of the prairie provinces. **C. E. "Clare" White** has been named general superintendent of the Con mine, at Yellowknife.

OBITUARIES

Joseph H. Sinclair, of New York, geologist and explorer, died in Toronto, Ont., on May 24 at the age of 66. He was an alumnus of the University of Rochester, took postgraduate work at George Washington University, M.I.T., and Columbia, and received a master's degree in science from the University of Rochester in 1912. He had conducted investigations and explorations in many parts of the world, was on the staff of the U. S. Geological Survey from 1904 to 1909, was later associated with the Aluminum Company of America, and had been director of research of Union Mines Development Corporation, a subsidiary of Union Carbide & Carbon Corporation, since 1943. Mr. Sinclair wrote extensively on geological and related subjects and was a member of many scientific and technical organizations, including the A.I.M.E.

Hamilton M. Lewers, California metallurgist, died on April 8 in Sutter Creek, Calif. He was associated at various times with the Guggenheim interests, Tonopah Belmont Mining Co., Treadwell Yukon Mining Co., at Tybo, Nev.; Idaho Maryland Mines Corporation, Grass Valley, Calif.; Argonaut Mining Co., Jackson, Calif.; and Wiston Copper Co. He was 61 years old.

Goodwin M. Trent, mining engineer, died recently at Auburn, Calif., at the age of 59.

Denman Dorr, mining engineer and superintendent of the Brush Creek mine, near Goodyears Bar, Calif., died on May 2 at Bowman, Calif., aged 53.

George P. Tweed, Duluth, chairman of the First & American National Bank of Duluth, died on April 30 at the age of 75. Mr. Tweed was first known in the mining field through his association with the late A. B. Coates, of Virginia, Minn., in the firm of Coates & Tweed. Their most important iron mining was the discovery of the Plymouth orebody at Wakefield, Mich. At the time of his death Mr. Tweed was operating the York iron mine, Nashwauk, Minn.

Charles E. Marr, 66, president last year of Northwest Mining Association, died at Spokane, Wash., April 16. He was president of Sheep Creek Gold Mines Co., Zincton Mines Co., and vice president of Spokane Idaho Mining Co.

Ernest J. Simons, 66, president of General Machinery Co., died at his home, E. 742 26th Ave., Spokane, Wash., April 17. He was a veteran of the Spanish American War. His company handled important navy contracts during the last war, and also handled the Trentwood and Mead aluminum plants at Spokane after they were turned over to the government by Aluminum Company of America, and maintained them until Henry J. Kaiser leased them.

Henry Allen Coggins, 71, Asheville, N. C., mine operator, died April 25.

Enrique Buj Echevarria, chairman of the administrative board of the Cia. Minera Aurora y Anexas, S. A., died in Mexico City on May 1, aged 70, after a long illness.

George E. Collins, 70, who had been a consulting mining engineer in Colorado for more than 40 years, died May 4 in a hospital in Ouray, Colo, of injuries sustained when a mine bus plunged off the "Million Dollar Highway" near Ouray. Four other men died as a result of the accident.

Arthur Frank Noel, aged 77, pioneer British Columbia prospector, died in Vancouver, B. C., April 18. He played a prominent role in the development of the Lillooet district, at one time owning the Pioneer mineral claim, nucleus of the holdings of Pioneer Gold Mines of B. C., Ltd.; and later bought for cash the old Lorne mine, forerunner to the Bralorne mine.

An Appreciation of Walter G. Swart by H. C. Parmelee

Walter G. Swart was a mining and metallurgical engineer of more than ordinary ability and success. He was a pioneer in electrostatic separation, and brought to commercial development the Blake-Morscher separator. He was associated with Hardinge in the development of the conical mill; and he was in charge of pioneer work for Jackling and Haydon Stone in the concentration of the magnetite ores on the Mesabi. Preliminary tests on these ores were made at the Mines Experiment Station of the University of Minnesota, and then a pilot plant, with a capacity of 100 tons per day, was built in Duluth. During World War I, this pilot plant operated commercially to produce low-phosporus sinter, imports of which has been cut off, and which was urgently needed for the noses of armor-piercing projectiles. When the war was over and materials and equipment could be obtained, a larger-scale plant capable of producing 350 tons of high-grade sinter per day, and operating on the flowsheet developed at the Duluth mill, was built at Babbitt, Minn., and operated until 1924. The various departments in this plant were so arranged as to form units in an ultimate plant with a capacity of 100,000 tons per day of crude ore (30,000 tons of sinter per day). This plant was shut down because of the drop in the price of iron ore, and the cutting off of various premiums, so that the economics were knocked out even on large-scale production. Walter Swart never lost interest in this deposit and its exploitations, and prepared many estimates from time to time, bringing the overall picture up to date with changing conditions. Undoubtedly some day his faith will be justified and this enormous tonnage of low-grade iron ore will become the source of an important tonnage of shipments from this district. He will always be known as a

(*Continued on page* 118)

Publications Received

(Continued from Page 112)

Africa. Tanganyika Territory, Preliminary Report on Mining Geology of Iramba-Sekenke Goldfield. Pp. 21, plus maps. Also a paper on "Piezo-Electric Quartz in Tanganyika." Pp. 14. Department of Lands and Mines, at Dodoma.

"Electrical Devices Applied to Metallurgical Research," by E. V. Potter. T. P. 661. For sale by Superintendent of Documents, Government Printing Office, Washington 25, D. C. Price 10c.

"Biological, Hygienic, and Medical Properties of Zinc and Zinc Compounds." Supplement No. 179 to U. S. Public Health Reports. Free copies on application to American Zinc Institute, Inc., Dept. A, 60 East 42d St., New York.

"Industrial Minerals as a Field for Prospecting in Alaska." Department of Mines, Territory of Alaska, Juneau. Pp. 80.

"Battelle Memorial Institute, List of Books, Publications, and Patents, 1929-1944." Pp. 72. Address the Institute at Columbus, Ohio.

"Mica." Bulletin No. 2, Geological Survey of Western Australia, Perth, Australia. Pp. 75.

"Glossary of Forging Terms." Kropp Forge Co., Chicago. Pp. 19.

"Mineral Industries Research." Circular No. 20. School of Mineral Industries, The Pennsylvania State College, State College, Pa. Pp. 36.

New Mexico. Report of State Inspector of Mines, for year ended Oct. 31, 1945. Pp. 19.

Canada. Report of Dominion Department of Mines and Resources, for year ended March 31, 1945. Pp. 220.

Mineral Production of Canada, 1943. Annual Report, Dominion Bureau of Statistics, Ottawa. Pp. 315. Price $1.

Mining Industry of Idaho, 1945. By Arthur Campbell, Inspector of Mines, Boise, Idaho. Pp. 282. This is a handbook of Idaho mines.

Tungsten Resources of Washington. By H. E. Culver and W. A. Broughton. Bulltin 34, Division of Geology, Olympia, Wash. Pp. 89. Price $1.

"Mining and Metallurgy as a Career." Issued by Australasian Institute of Mining and Metallurgy (Inc.), Melbourne, Australia. Pp. 27.

"Tungsten Deposits in Beaver County, Utah. Bulletin 945-D." Pp. 81 to 111, with maps. Price 65c.

Finland. The Geological Commission, at Helsinki, has issued ten bulletins, principally in German. Four of these contain the Proceedings of the Geological Society of Finland, comprising 23 papers. Among the other bulletins, for the most part devoted to geology, is a 78-page paper, in English, on the "Geochemistry of Tantalum."

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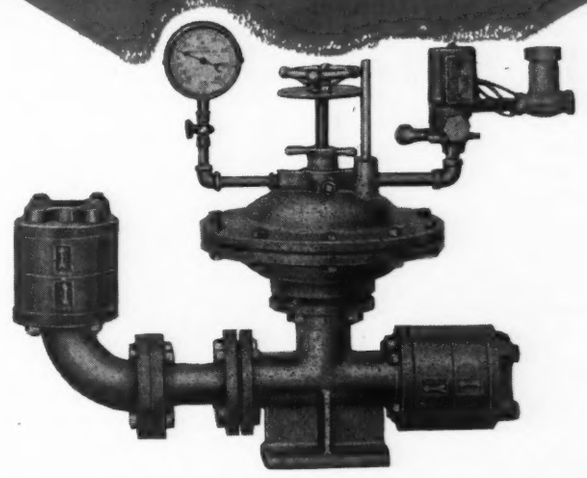

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Appreciation Walter G. Swart

(Continued from Page 116)

pioneer in the development of Minnesota taconite ores.

Walter Swart accomplished other things as well. He brought to the attention of clients the property that became the American Zinc Company's operation in Mascot, Tennessee. He organized the Duluth Engineers Club. He conducted, after Mesabi Iron shut down, a long and carefully detailed study of the Canisteo property of the Congdon Estate, after Oliver Iron Mining Company had terminated its lease. As a result of this work, Cleveland-Cliffs leased the property for a few years, and are now operating it for the Congdons. Walter Swart attended the Colorado School of Mines, and in 1917 he received the honorary degree of engineer of mines from that institution.

Mr. Swart was at the turn of the century employed as a laboratory assistant in the assay offices of Hal Williams Hardinge, in Denver, Colo., and the elder Mr. Hardinge, who died on Sept. 16, 1943, frequently consulted him over a period of many years on professional matters having to do with mining engineering. Mr. Swart was, in fact, married in the Hardinge home in Denver and was held in high personal regard by the members of the Hardinge family. Harlowe Hardinge, now president of the Hardinge Company, said recently that in Mr. Swart's passing the mining fraternity has lost one of its truly great personalities.

Acknowledgment is gratefully made to T. B. Counselman, of The Dorr Company, for supplying the technical information on early operations in the concentration of Mesabi's magnetite ores; and to Harlowe Hardinge.

Col. Arthur S. Dwight—An Appreciation by Donald M. Liddell

In the death of Colonel Arthur S. Dwight the world has lost much more than one of its most eminent metallurgists. He was a scholar, an economist, a soldier—did much good unobtrusively, and was a pleasant companion who will always be missed by those who had the honor of his friendship. Colonel Dwight was born March 18, 1864, the son of Benjamin Pierce Smith and Elizabeth Fiske Dwight Smith, of Mayflower descent. He assumed his mother's maiden name on coming of age. He graduated at the Polytechnic Institute (Brooklyn) in 1882 and received the degree of E.M. from Columbia in 1885, which institution later recognized his talents by bestowing on him the degrees of M.Sc. (1914) and D.Sc. (1929). His smelting experience began in Colorado in 1885, and was continued in Texas, Kansas, and in San Luis Potosi and Cananea, Mexico. I do not know when the idea of continuous roasting and sintering occurred to Colonel Dwight, but rumors of a striking innovation in that field began to be heard generally in 1906, though the machine of that period was only a short step on the road to the improved machines of the present.

We are accustomed to think of Colonel Dwight primarily as the genius who revolutionized roasting and sintering, but he was probably also responsible for equally important changes in blast-furnace practice in lead smelting, through the improvements that he introduced in mechanical charging and charge make-up and in little niceties of blast-furnace design.

He became impressed by the seriousness of the international situation while the politicians still thought the United States could be kept out of World War I, and was commissioned major in the Engineer Reserve on Jan. 23, 1917. He assisted in organizing the First Reserve Engineers, which later became the 11th Engineers and was commanded by Dwight in France. His was one of the first, if not the first, American combat unit to serve in France under the American flag, and Dwight's reminiscences of the battle experience of the Eleventh, particularly on the front before Amiens during the German 1918 offensive, were exciting and instructive. He became consultant to the French Government in some of its war metallurgical problems and later on some of its peacetime conversion work and was decorated by both the British and the French governments—D.S.O. and Chevalier of the Legion of Honor. He was also salvage officer of the A.E.F. and received a citation from General Pershing. His interest in national defense was always keen, and he was still carried on the rolls as a Reserve Officer (inactive) at the time of his death. He married Jane Earl Reed in 1895, who died in 1929, and Mrs. Anne Howard Chapin, his second wife, who survives him.

Dwight joined the American Institute of Mining Engineers in 1885 and was its James Douglas Medalist in 1842. He was vice-president of the Institute in 1921 and president in 1922. He was one of the original members of the Mining and Metallurgical Society of America; a member of the Institution of Mining and Metallurgy of London, and an honorary member of the Society of Engineers of Louvain University, besides being active in many civic organizations.

A LETTER

Danger of Communist Control

The Editor:

Your editorial entitled "Mining Wide Open to Communist Control," is certainly well taken. The reason that the Senate works for the labor union is because the unions work for those boys in the Senate on election days. The labor unions have set bloc voting in such a manner as to threaten the very foundations of the United States. Right now the soft coal strike has cut steel production around 50 percent, and, as anyone knows, coal, iron, and crude petroleum are the very vitals of civilization. Just so long as the Political Action Committee holds the limelight by voting its strength in blocs, the majority of Congress will be more or less concerned and the operators will be left out. Abraham Lincoln in his day said that a nation could not exist half slave and half free. If he was living today, he would say that a nation cannot exist half capitalistic and half communistic.

STRAUSS L. LLOYD.

Inverness, Fla.

News of the Industry

(*Continued from page* 102)

likely ever again to be equaled. All of the major deposits which outcrop on surface have probably been discovered, but orebodies whose occurrence is not visible may still be found.

The belief was expressed that termination of governmental controls and a return to a free market would result in more than sufficient lead production from parts of the world outside the Russian sphere to supply all essential needs for the metal.

Monopoly Practices Charged To International Nickel

Monopoly of the importation, manufacture, distribution, and sale of nickel ores and products is alleged in a complaint filed May 17 by the anti-trust division of the Department of Justice, naming the International Nickel Company of Canada, Ltd., the International Nickel Co., Inc., of New York, and three officials of the two companies. Maintenance of cartel agreements with foreign competitors to limit production, fix world prices, and allocate sales in world markets is also charged.

Separation of the Canadian corporation from its American subsidiary is sought in the action, which requests the court to formulate a plan for redistribution of assets. It is specified that the two companies control more than 90 percent of nickel ore and product transactions in the United States, and have produced, shipped, and sold a major share of nickel products consumed abroad. Combined assets are cited as approximately $300,000,000.

Commenting on reports of the suit, R. L. Beattie, a vice president of the Canadian company and general manager of operations at Copper Cliff, pointed out that Canadian nickel is in active competition with other production, including nickel produced by the United States Government from Cuban deposits, and has also to compete with many other alloying elements. Substantial subsidies were paid by the United States Government during the war, he asserted, to permit competitors to meet the low prices charged by International Nickel in the United States. Agreements in restraint of competition were denied.

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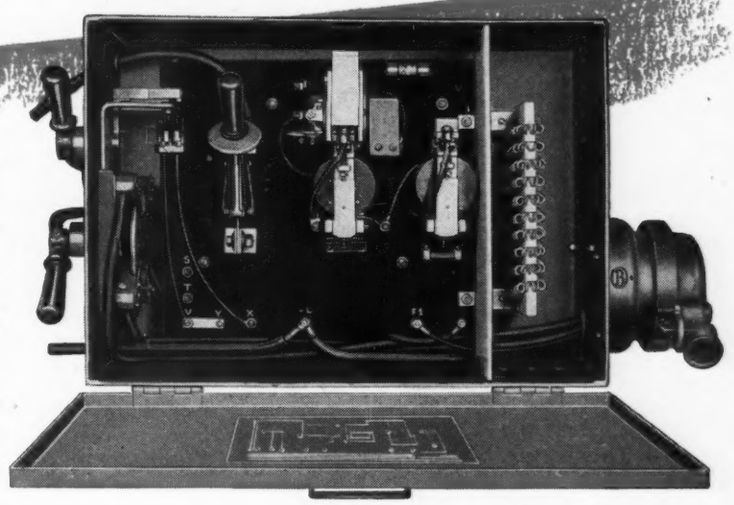

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SIMPLE DISCONNECT SWITCH—regular O-B Quick-Break switch of ample capacity mounted directly on panel.

BUILT-IN REVERSING SWITCH—interlocked with control switch to prevent motor reversal with power "on".

FOOL-PROOF ATTACHMENT PLUGS—permits motor cable-to-starter connections with unskilled workmen. No electrician required.

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REGIONAL NEWS

MONTANA

Placer operations resume in Park and Jefferson counties—Ohio-Keating acquired by new group

★Deer Lodge Mining Co., of Helena, was recently incorporated in Montana and has obtained a lease and bond on the Emery Consolidated Mining Co. property near Deer Lodge. Robert P. Porter, of Helena, president of the Porter Brothers Corp.; G. T. Vandel, of Helena, president of the Last Chance Gulch Mining Association; John B. White, Jr., of Helena; J. A. Mann, of Helena; and D. L. Skidmore, of Portland, Ore., are officials in the newly organized company.

★L. F. Teutsch, owner and operator of Mountain Talc Mines, is producing cosmetic, ceramic, and lava-grade talc near Ennis, Madison County. This property was developed during the war as a source of high-grade talc for use as radar insulation. Exploratory work was conducted by the U. S. Geological Survey and the U. S. Bureau of Mines in an effort to insure production of this strategic material.

★Montana Mines, Inc., has obtained placer ground near Deney's Lake from Deer Lodge Farms. The company plans to start placer operations with dragline and bulldozers in the near future. About 2,500 cu.yd. of gravel per day will be washed. Company officials are George Pierson, manager of the Deer Lodge, Livingston Greenwood, Seattle; J. J. McGreevy, of Medina, Wash., and C. P. Grosenich, of Seattle.

★The mill at the Green Mountain mine has been rebuilt after having been destroyed by a recent fire. The new 50-ton flotation mill will produce a copper sulphide concentrate containing gold and platinum. The mine, which is 5 miles northwest of Dixon, Mont., is managed by Earl Elstone.

★Anderson Brothers, of Lewistown, have started a development program on the Blue Dick mine, in Judith Basin County. The operators intend to increase the scale of their operations. A 50-ton flotation mill produces a copper concentrate which contains gold and silver.

★Ruby Gulch Mining Co. near Zortman, Phillips County, is being examined for the purpose of planning resumption of mining operations. The Ruby mine was producing gold when Order L-208 became effective, and employed about 110 men. It is equipped with a 300-ton coarse-grinding, cyanide leaching plant and a diesel power unit. Carl J. Trauerman, of Butte, is president of Ruby Gulch Mining Co.

★Winston Brothers Co. recently resumed operation of its Yuba dredge near Jefferson City, Jefferson County. This dredge operated for several years prior to the war, and operations were discontinued because of L-208 in 1942. About 20 men are employed under the supervision of A. Strojan, Jr., of Helena, manager of the company.

★J. C. Archibald, general manager of the Monongahela-Mount Washington Mining Co., has moved his headquarters from Helena to Nogales, Ariz. Mr. Archibald is developing a mining property in Sonora, Mexico. This company has been active in Montana for several years, the latest operation having been at the Mt. Washington mine, in Jefferson County. Hugh K. Gaw, secretary of the company, has announced that the entire mining and mill equipment of the Montana properties will be disposed of.

★Rademont Mining Co. was recently incorporated. C. W. Snow and James H. Price, of New York City; H. J. Fennimore; Charles L. Ruhel; and H. D. Carmichael, all of Butte, are officials of the new company. The Ohio-Keating property near Radersburg, Broadwater County, has been obtained from the M & M Mining Co. Before the war the Ohio-Keating group mined and milled 90 tons of gold ore per day. Pete Mosier, who managed the property for M & M Mining Co., is also resident manager of the new organization.

★The summer meeting of the Mining Association of Montana has been announced for Aug. 30 and 31, and will be held at the Florence Hotel in Missoula. Western Montana Mine Owners and Operators Association and the Missoula Chamber of Commerce will be hosts for this meeting, which is the first summer meeting to be held by the association since 1941. Robert Porter, president of M.A.M., has appointed Arthur J. Mosby, secretary of the Western Montana Mine Owners and Operators Association, chairman of the general arrangements committee.

★Emigrant Dredging Co., subsidiary of the Lucky Tiger-Combination Gold Mining Co., of Kansas City, recently resumed operation of its Yuba dredge in Emigrant Gulch, Park County. George B. Norberg, of Kansas City, is president of the company and Ernest J. Stanley, of Emigrant, is resident manager.

★Saranac Mining Co., headed by R. K. Neill and Conrad Wolfle, has been organized and plans to develop silver-lead properties northwest of Philipsburg, Granite County. The company has obtained the Brooklyn, Nonpareil, and Saranac properties.

★Irma Mines, Inc., has operated steadily, although on a reduced scale, throughout the war period. Lyman H. Brooks has kept the operation going in spite of extreme difficulties imposed by labor and equipment shortages. A new orebody has been developed in recent months which produces a lead-zinc ore averaging about 20 percent combined lead and zinc, with important values in silver. A 35-ton selective-flotation mill produces both a lead and a zinc concentrate. Brooks obtained the property in 1920. Total production of the property is estimated at a million dollars, about half of this amount having been produced by the present operator of the property.

IDAHO

Bunker Hill sinking to 4,000-ft. level—Dayrock opens rich lead-silver showing

★Polaris Mining Co. has declared a dividend of 10c. per share, amounting to $200,000, and payable April 30 to stock of record April 13. This brings the company's total dividend record to $1,740,000.

★Bunker Hill & Sullivan Mining Co. has declared a dividend of $327,000, combining the regular 12½c. dividend and an extra dividend of like amount, totaling 25c. per share. Payments will be made June 1 to stock of record May 6. This brings the company's dividend disbursements this year to $654,000.

Bunker Hill's lowest mine level is 2,800 ft., or 400 ft. below sea level. The company is now sinking another 1,200 ft. to the 4,000 level, which will make it the deepest mine in the Coeur d'Alene district.

★Dayrock Mining Co., one of the Day group of mines in the Coeur d'Alene district, has opened an exceptionally large and rich body of lead-silver ore on the 650-ft. level of the mine in Nine Mile Canyon, a short distance north of Wallace. The orebody is in what is known as the Ohio vein, which has produced considerable tonnage above the 650 level. Where opened near the shaft the vein shows a width of 6 ft. of high-grade ore. The drift was carried on the vein for a distance of 70 ft., where another crosscut opened ore 12 ft. wide. The drift was then continued along one wall of the vein to a distance of 190 ft. from the shaft, where another crosscut has opened a 17-ft. width of ore. Samples of the crude high grade have been assayed, showing returns of 76.5 percent lead and 48 oz. silver per ton, with no zinc apparent in the ore. The vein is crisscrossed with local

Idaho *(continued)*

slickenside fractures and laced with streaks of high grade from a few inches up to three feet width. Length of the oreshoot is still undetermined. The mine is equipped with a modern flotation milling plant.

★According to figures compiled by the U. S. Bureau of Mines, Idaho produced $39,792,753 worth of minerals during 1945, 90 percent of which came from the Coeur d'Alene district, in Shoshone County. **Totals were as follows:**

Metal	Quantity	Value
Antimony, tons	2,956	$ 936,460
Cadmium, lb	588,058	497,873
Copper, lb	3,350,000	455,600
Gold, oz	21,000	735,000
Lead, lb	135,500,000	11,653,000
Mercury, flasks	400	40,000
Phosphate, tons	131,753	721,197
Silver, oz	7,857,000	5,587,200
Tungsten, units	94,733	1,226,423
Zinc, lb	156,000,000	17,940,000
Total		$39,792,753

The Bunker Hill smelter and Sullivan zinc plant produced the entire output of cadmium; the tungsten came entirely from the Bradley Mining Co.'s Yellow Pine mine, at Stibnite, in Valley County, and the Ima mine, at Patterson, in Lemhi County. Most of the silver, copper, lead, and zinc came from the Coeur d'Alene district.

★Jack Waite Mining Co., operated by the A.S.&R. Co. under a lease agreement, reports a loss of $17,408 for the year 1945. Due to the prevalent manpower shortage, the company employed a crew of only twelve men and produced 4,813 tons of ore, compared with 10,308 tons in 1944. The mine straddles the Idaho-Montana state line near Murray. The upper workings of the mine are in Idaho, but in the lower levels the orebody has moved over into Montana.

★Sunshine Mining Co. reports net profits of $103,455.53 for the first quarter of 1946. The company's production capacity was cut more than 50 percent by the manpower shortage and because of an underground fire which stopped production entirely for several weeks. Sunshine has not produced from its original veins since 1942, at which time its priorities were cancelled because it was rated as strictly a silver mine. All production since that time has been from new discoveries in parallel veins which contain a large percentage of lead, and in which Sunshine owns a half interest in the net profits. All of these different interests are operated by Sunshine through its deep workings.

★Sunset Minerals Co., operating the old Liberal King mine, in the Pine Creek district southwest of Kellogg, is conducting a diamond drilling operation to determine the tonnage of ore available for milling between the 1,000-ft. level and the apex of the vein. The drilling is starting from the 600 level to prospect the vein on the 800. When this is completed a horizontal hole will prospect the same structure on the 600 level. The company is milling from the 1,000 level up, where the orebody

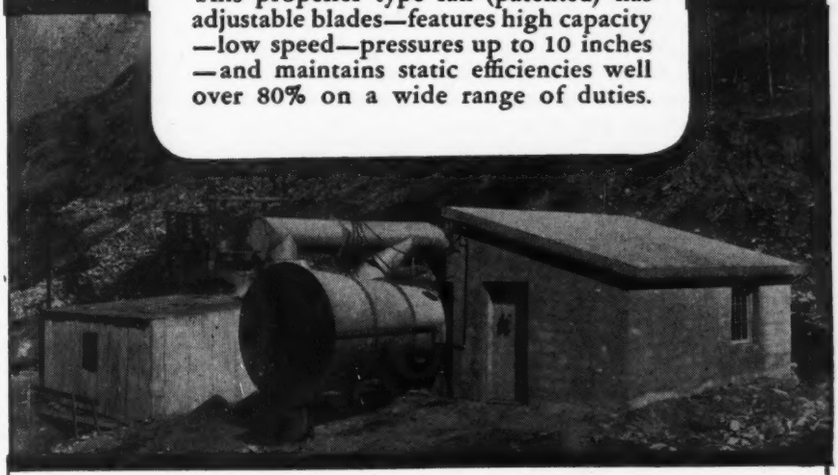
Jeffrey EQUIPMENT Meets Metal Mine Needs

LOCOMOTIVES

A typical metal mine installation showing Jeffrey Locomotives handling iron ore. These locomotives have the stamina to stand up under rough usage, and are designed to protect the equipment from water dripping from the roof and wet muck over the track.

AERODYNE FANS

A Jeffrey Aerodyne fan installation at a zinc mine in Colorado. Adequate air supply at the working face is very essential to maintain top production. This propeller type fan (patented) has adjustable blades—features high capacity—low speed—pressures up to 10 inches—and maintains static efficiencies well over 80% on a wide range of duties.



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Boston 16	Cincinnati 2	Detroit 13	Huntington 19	New York 7	Scranton 3
				Philadelphia 3	Salt Lake City 1

Idaho *(continued)*

is around 12 ft. wide, with an average mill feed of 4.9 percent lead and 10.7 percent zinc. The lead concentrates produced average 60 percent lead and the zinc concentrates 50 percent zinc. Silver values are low. The vein is a "blind" structure lying very flat in the formation and was first discovered on the 1,000 level.

★Crystal Lead Mining Co., whose property in the Summit district, near Murray, is under lease to the Zanetti Bros., of Wallace, has recently opened high-grade galena ore 4 ft. in width on the No. 4 tunnel level of the mine, according to one of the Zanetti group. The leasers first operated the mine from the No. 3 tunnel level to the surface, producing a considerable tonnage of clean shipping grade ore in addition to mill tonnage. The concentrates from one 800-ton mill run averaged 68 percent lead, 26 oz. silver, and 4 percent zinc. The oreshoot on the No. 3 level was 90 ft. long. A winze was then sunk on the vein to the No. 4 level, where drifting opened the same orebody. The mine is the farthest north property in the Coeur d'Alene district and is approached by a long truck haul over two ranges of mountains between the mine and the shipping point at Wallace.

★Lincoln Mining Co. reports a profit of $41,508.51 for the year 1945. The company is a non-operating concern and derives its income from royalty payments on ore produced by the Silver Dollar Mining Co., which owns a 99-year lease on part of the Lincoln group. The Lincoln company's royalty amounts to 12½ percent of Silver Dollar's gross output, which is derived from a one-third interest in the net profits from a small block of ground operated by Polaris and Sunshine mining companies. Lincoln company's report says 31,668 tons of ore were mined during 1945 from this area on the 2,700, 2,900, and 3,100-ft. levels, which averaged a mill feed of 57 oz. silver and 4.23 percent lead per ton, or an actual value of $41 per ton. Developed ore in the same area is estimated at 373,248 tons as of Jan. 1, 1946.

WASHINGTON

Howe Sound sinking 500-ft. shaft at Holden—Silver fabricating plant projected for Spokane

★Howe Sound Co. is sinking a 500-ft. shaft at its Holden property, in the Cascades, to block out a new orebody below the 1,500-ft. level. A force of 350 men is employed at present, which would be increased by about a hundred if men were available. The company is mining and milling 2,000 tons of ore daily, and averaging two and a half carloads of concentrates daily to the Tacoma smelter. More than half the gold and silver and nearly all the copper produced in the State come from this property. J. J. Curzon is general manager at the Holden property. M. A. Pearse, mill superintendent, has recently been transferred from Holden to New York and made assistant to the president of the company. The company also owns and operates the Britannia mine, near Vancouver, B. C., and mining properties in Mexico. A dividend of 30c a share was paid on March 30.

During the first quarter of this year the company's copper sales were 6,146,226 lb., against 5,946,332 in the preceding quarter; gold, 13,016 oz., against 12,164 oz.; silver, 154,743 oz., against 225,860 oz.; lead, 3,644,594 lb., against 5,720,609 lb.; and zinc, 6,361,639 lb., against 7,406,239 lb.

★Big Lake Mining Co., near Kettle Falls, in Ferry County, will spend about $80,000 on equipment, buildings, and development this season, according to a statement made to the stockholders by Will Everett, president, at the annual meeting in Spokane in April. He reported that $12,900 was expended on this lead-zinc property last year. A power line will be extended to the mine, and 2,000 ft. of raises and drifts will be driven on the 400-ft. level.

★The First Thought gold mine, near Orient, south of the Canadian border, has resumed operations, according to Russell Parker, president and general manager. It was closed four years ago by government order L-208. The ore will be treated in the company's 50-ton cyanide plant.

★Magney Brothers are constructing a mill on Deep Creek, where ore from the Last Chance mine will be treated. New ore is being opened up at the property. In the same area Jamison & Higgans are taking out zinc ore from a shaft of the Deep Creek mine, and sending it to the Sierra mill, which is working 24 hours a day on ores from that mine, the Sierra zinc property, and others. In the same district, Dayrock Metals Co., with Roy Davidson in charge, will be working at the old Electric Point mine. John Colby is opening ore at the Admiral Consolidated property, and work is being done at the Gladstone.

★Former U. S. Senator Clarence C. Dill, of Spokane, has been conferring in New York and Washington, D. C., with representatives of Western silver producers who propose to establish a large silver fabricating plant in Spokane to handle the output from half a dozen states. He will prepare articles of incorporation for the company, ownership of which will be divided among Idaho, Montana, and Utah operators.

★Dr. Vernon E. Scheid, geologist with the U. S. Geological Survey, has reported a large deposit of high-aluminum clay, only a few miles southeast of Spokane, said to carry a high content of titanium oxide, one of whose important uses is in making high quality white paints. Dr. Scheid declared the deposit "contains 12,533,000 dry tons of indicated ore that averages 28.7 percent alumina and 5.6 percent available iron oxide." The U. S. Bureau of Mines worked jointly with the Geological Survey on the investigation.

★War Assets Administration has allocated $590,850 to place the Mead reduction plant in operating condition for Kaiser Aluminum. It was pointed out in Spokane that the allocation covers putting two pot lines in operation at Mead, but does not provide for the four additional lines which are to be put in operation later. Shipments of copper busbars from Torrance, Calif., to equip the two pot lines, were expected in Spokane before the middle of May, according to James G. Wilcox, Spokane W.A.A. administrator. Engineers estimate the conversion cost of the Mead plant will be $800,000.

The Spokane aluminum plants will be operated by the Permanente Metals Corp., but will be referred to as Kaiser Aluminum, a division of Permanente, according to a statement released when Henry J. Kaiser visited the plants in early May. He said both plants should be in operation by the end of June and that when they reached full capacity, 3,500 would be employed. Trentwood will start operations first and will operate with scrap or ingots available from outside sources until Mead gets into operation with five of its pot lines. It will make sheet, plate, and cold-rolled strip aluminum. At Mead the production will begin with two pot lines. Another pot line will be added every three weeks until five are in production. Norman L. Krey is in charge at the Mead plant.

CALIFORNIA

Grass Valley operations regain momentum—Kaiser interests acquire Eagle Mountain iron mine

★Mountain Copper Company, Ltd., owner and operator of the Hornet mine, near Redding, Shasta County, is celebrating its 50th year of continuous operation. William F. Kett, general manager, has been in direct charge of the property for more than 40 years. Apart from the regular pyrite production shipped to chemical plants in the Bay area, the company is milling some 460 tons of copper-zinc ore mined along the southwest wall of the main pyrite orebody in the Richmond section of the mine. The mill was completed in July 1943, and has been in operation continuously ever since. All surface plant facilities, including change room and office building, warehouse, mine car repair shop, steel-sharpening shop, welding shop, compressor building, machine shop and garage, framing shed, pipe shop, steel racks, and greasing station, have been transferred to the present mill site. Buildings for general mine offices and tramway terminal are to be

California *(Continued)*

constructed soon. J. G. Huseby is general superintendent, with C. W. McClung and R. Kenneth McCallum in charge of the mine and mill respectively.

★Exploration work is in progress at the Afterthought copper-zinc mine, near Ingot, Shasta County, under option to the Coronado Copper & Zinc Co., a subsidiary of the Harvey Mudd interests, of Los Angeles. The mine has been unwatered to the 800 level and many workings have been rehabilitated to permit sampling and development. Surface and underground diamond drilling also is carried on, with eight holes completed so far. Lyttleton Price, company engineer, is in charge of operations.

★With manpower shortage still acute, only limited rehabilitation and development work are in progress at the Surcease gold mine; near Oroville, Butte County, owned and operated by Hoefling Brothers, of Sacramento. The Big Bend copper-zinc mine, which produced substantial copper and zinc concentrates during the war years, has been closed. Minor changes in the Surcease mill flowsheet are being made preparatory to handling Surcease gold ore when production starts. Allan Jones, manager, directs operations. William E. Messner is superintendent, and Hugh H. Bein, geologist and metallurgist.

★Work at the Ruby, Oxford, and Gold Bluff mines, near Downieville, Sierra County, is centered in development of the Gold Bluff and Oxford workings, with about 10 men employed under the direction of L. L. Huelsdonk, general manager. Good ore has been encountered in both properties, and milling operations are to be started soon at the remodeled Oxford mill. Operations to be carried out as soon as more men are available include rehabilitation of the caved Ruby shaft and construction of a new headframe, and unwatering of the underground inclined shaft in the Gold Bluff as a preliminary to sampling and development of the lowest levels. Production of chrome ore has been suspended. The mines are owned and operated by C. L. Best, of San Leandro.

★Though conditions are still far from normal in the Grass Valley area, chiefly because of an inadequate labor supply, mining operations are expanding slowly but steadily. Idaho Maryland Mines Corporation now has 260 men on the payroll, and is milling 13,000 tons of ore per month at the Brunswick mill and 1,200 tons per month at the Idaho mill. Rehabilitation has been completed at the Brunswick mine, with exploration for new veins going on in the 3,280 level area. Much work remains to be done in the Idaho mine. The flowsheet of the Brunswick mill has been changed, and extra equipment is being added to increase its capacity, which is 600 tons at present. This will be raised to 950 tons when a Telsmith

Pump Proves "Tougher" Than Any Ore It Has Been Called Upon To Handle

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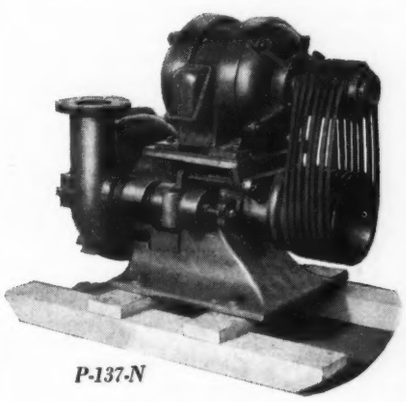
Where abrasive materials are handled, Amsco-Nagle pumps are the logical choice, because of advanced design, with water end parts made of austenitic manganese steel, "the toughest steel known."

Illustration P-113-N shows an 8" Type "T" Amsco-Nagle pump for handling ore.

Amsco - Nagle horizontal centrifugal pumps are built for operation in the most abusive service and, in addition to fully meeting the requirements of high mechanical and hydraulic efficiency, have long service life inbuilt. Simplicity and ruggedness, so important where comparatively frequent servicing or replacement is necessary, are design features. The water-end and bearing stand are separate units, and abrasive liquids cannot possibly come in contact with bearings. The method of mounting the water-end on the bearing stand insures positive alignment



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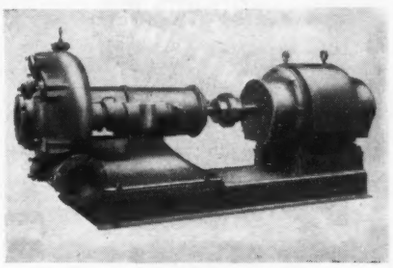

P-113-N

of the shaft. Highly effective stuffing box is readily accessible. Type "T" pumps are used in both mining and milling operations under flooded suction conditions or where priming is no obstacle.

Illustration P-137-N shows an Amsco-Nagle overhead drive pump—one of 24 Amsco-Nagle pumps used for passing the slurry through various stages in a lead and zinc ore treating operation.

Amsco - Nagle horizontal centrifugal pumps fitted with manganese steel "water-ends" are available in sizes from 6" up to 16".

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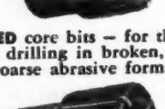

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California *(continued)*

fine crusher has been installed, and is planned to add a third ball mill before the end of the year to step capacity up to 1,300 tons. Tailings losses have dropped from 35c. to an average of 19c. per ton. The riffle plant now used at the Idaho mill is to be replaced with flotation equipment. Neil O'Donnell is general manager, and Rollin Farmin, mine superintendent.

★In the Copperopolis area of Calaveras County two gold operations are active, in addition to the Penn copper-zinc mine, at Campo Seco, operated by Miller and Clemson, of Los Angeles, and the copper tailings enterprise of Calaveras Copper Venture at Copperopolis. Sierra Metals, controlled by Stewart and Nuss, Fresno contractors, and H. E. Bush, mining engineer, is mining more than 450 tons of gold ore from an open pit and treating it in the nearby Mt. King mill. Production is soon to be increased to 850 tons. Pit equipment includes a Northwest power shovel and 8-ton trucks. Mill treatment includes one-stage crushing, grinding, amalgamation in bowls, and flotation of the bowl overflows. Resultant bullion is shipped to the U. S. Mint in San Francisco and concentrates are sent to the Selby smelter. B. H. Miller is superintendent and Thomas B. Rice, engineer.

★Two miles distant from the Mt. King operation, the Pacific Bridge Co. is exploring and developing the old Royal gold mine, with about 25 men employed under the direction of Howard Castle, superintendent. Underground operations are centered on the 800 level and recent development work has disclosed a large orebody containing fair gold values. The Royal mill is handling from 60 to 70 tons of development ore a day, with milling practice differing little from that at the Mt. King mine. Humphrey spiral units are to be tested on mill tailings.

★The Penn mine, at Campo Seco, is producing steadily, and 3,500 tons of copper-zinc ore per month are trucked to the flotation plant at the company's Eagle Shawmut property near Chinese Camp, Tuolumne County. Only limited development work is in progress at the Eagle Shawmut, a well-known gold producer. D. C. Peacock manages both the Penn and Eagle Shawmut, with C. A. Kerr in charge of the mill.

★At the property of Calaveras Copper Venture, Copperopolis, activities are centered in removing by sluicing the remainder of the copper tailings below the old Union mill. The 1,500-ton flotation plant is handling from 600 to 700 tons of sluiced material a day, water shortage making impossible full capacity operations. The tailings pile originally contained 600,000 tons of material, with an estimated copper content of 5,000,000 lb. P. R. Bradley, Jr., heads Calaveras Copper Venture, with Hugh Coke, superintendent, in charge of operations.

★The Newton copper mine near Ione, Amador County, managed by the Pacific Mining Co., P. R. Bradley, Jr., president, is producing steadily, with mine output going by truck to be stockpiled at the railhead near Ione. Harold Hanson is superintendent.

★Transierra Gold Mining Co., W. A. Hayes, president, San Francisco, developing the North Star and other holdings near the town of Tuolumne, Tuolumne County, is considering plans for early construction of a milling plant, according to recent announcement.

★The 500-ton mill at Bodie, Mono County, operated by Roseklip Mines Co., of San Francisco, until the gold mining shutdown order L-208, has been destroyed by fire, according to a recent report. The mill was to be used for pilot-mill operations by Sierra Mines, Inc., S. B. McCluskey, general manager and consultant, testing the mineral holdings owned by the Cain Estate and formerly operated under lease from J. S. Cain, of Bodie, by Roseklip Mines.

★Kaiser Company, Inc., Iron and Steel Division, announced May 20 it has acquired from E. T. Foley and associates, of Pasadena, all outstanding rights and interests in the Eagle Mountain iron ore mine. Located in Riverside County, about 130 miles from the Kaiser plant at Fontana, the deposit will, with other extensive Kaiser holdings, round out the company's program for development of adequate sources of low-priced, high-quality iron ore.

Extensive drilling tests by the U. S. Bureau of Mines have indicated a large volume of high-quality ore on the Eagle Mountain property. Testing to date has covered only two miles of the 7-mile-long area of the main orebody. Based on present capacities, the mine is said to assure the Fontana mill 50 years of economical operation.

★Calaveras Cement Co., William Wallace Mein, president, on April 27 placed in operation an additional kiln at the mill at Kentucky House, near San Andreas, Calaveras County. The new kiln is 360 ft. long and has a capacity of 3,000 bbl. daily, which, with the two other units handling 3,800 bbl., raises the total plant capacity to 6,800 bbl. of cement a day. The event was celebrated by an old-fashioned barbecue, followed by conducted tours through the mill. Nearly 1,500 engineers and guests attended, including the operating committee of the company composed of William Wallace Mein, Jr., vice president; H. C. McGinn, vice president, and J. B. Smith, treasurer.

★The California State Supreme Court, in two out of three decisions, has upheld employers' contentions they do not have to pay unemployment insurance tax on employees operating as independent contractors. In one decision the Supreme Court held the Empire Star Mines Company, Ltd., operator of a group of gold mines in Grass Valley, Nevada County, did not have to pay

unemployment insurance for independent contractors working in claims in the North Star mine. The California Employment Commission had claimed the men are employees and required the mining company to pay unemployment insurance. The commission was reversed in a trial court and the Supreme Court on April 23 upheld the judgment. A similar ruling was handed down in the case of the Knoxage Water Co., of San Diego, but an opposition ruling was made when the Twentieth Century Lites Co., of Los Angeles, was ordered to pay unemployment insurance tax on its salesmen.

★Despite persistent disapproval by a minority group of stockholders opposing Central Eureka Co.'s plan of assessment of 25c. a share, thought to be required properly to develop its property in Sutter Creek, Amador County, directors on May 16 levied an assessment of 10c. a share upon the capital stock. The new assessment, No. 71, is payable May 27. Any shares on which the assessment had not been paid by June 27 will be auctioned off at the company's office in San Francisco July 15 to cover the assessment and a 5 percent penalty, or, if not sold, forfeited to the company. The directors also announced a further assessment of 15c. a share could be expected in about three months.

ARIZONA

Bagdad starts glory-hole mining with successful blast—Wage rise granted at Inspiration

★Mine and smelter workers of the Inspiration Consolidated Copper Co. and International Smelting & Refining Co. will receive an increase in pay amounting to $1.48 a day, retroactive to Feb. 7, 1946, on a basis of 18½c. an hour, according to an announcement made by Cornelius Morrell, of the Mine, Mill and Smelter Workers Union, CIO.

A strike of workers in the Miami area was averted through the successful negotiations of company officials and union representatives. Morrell declared that because of reclassification of jobs, miner's pay will be increased from $7.45 to $7.77 a day, and timbermen will go up from $7.77 to $8.09 a day. These rates are in addition to the retroactive pay.

★Fifty idle miners, all war veterans, demanded a public hearing April 26 in Clifton, Ariz., on their complaint that they had been unjustly deprived of unemployment compensation. The nonunion miners of the Phelps Dodge mine at Morenci, Ariz., addressed a petition to Frank Flynn, U. S. District Attorney in Phoenix, to State Selective Service headquarters, and to the Arizona American Legion, demanding that the veterans be heard.

Recently the State Employment Security Commission ruled that the ex-

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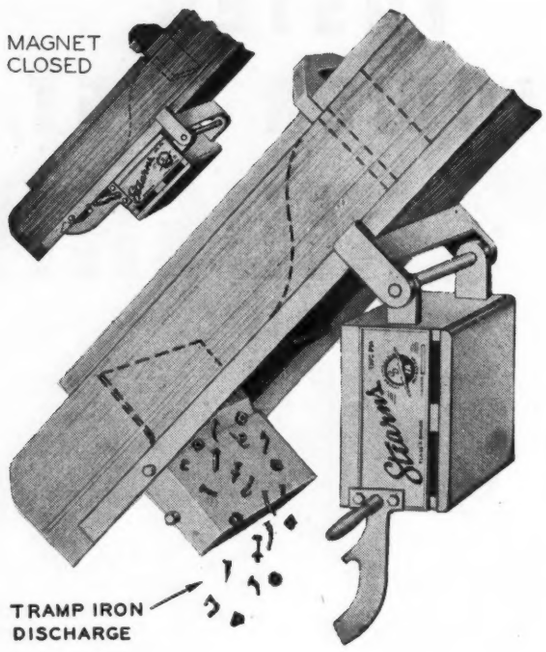

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Arizona *(Continued)*

servicemen were not eligible for unemployment compensation. Bruce Parkinson, director of the commission, explained: "The decision was based on the Servicemen's Readjustment Act which provides payments shall be denied claimants who belong to a grade or class of workers interested in or participating in a strike existing at an establishment or place of business."

The 50 veteran miners who signed the petition alleged they were unable to go to work during the strike because of heavy picket lines, locked gates, and armed guards stationed within the grounds. Work at the Morenci mines, along with other Phelps Dodge properties throughout the State of Arizona and at Tyrone, N. M., ceased operations March 20.

Meanwhile, the strikes in the copper industry continued to gain a strangle hold on the output of copper. Phelps Dodge has agreed to give employees an increase in wages as soon as an increase in the price of copper is allowed by the OPA. An offer of a government subsidy was refused.

★A majority of the employees of the Magma Copper Co. at Superior recently voted against representation by the union for the purpose of collective bargaining. Out of a total of 562 ballots which were counted, 330 were opposed to union representation and 232 favored it.

The election was held under the auspices of the National Labor Relations Board, and the specific question considered by the voters was, "Do you wish to be represented by the International Union of Mine, Mill and Smelter Workers, CIO?" The only answers allowed on the ballots were "Yes" and "No."

★A large blast involving 28,600 lb. of explosives marked the beginning of large-scale openpit operations on April 29 at the Bagdad Copper Co. An estimated 150,000 tons of copper ore broke into the glory hole. The explosion was touched off by a new system of electrical firing which utilizes a series of devices to permit confinement of explosive gases and produce secondary fragmentation. The blast was said to represent the first use of this system west of the Mississippi.

Production of the mine in 1945 was about 600,000 tons, largely from underground workings. It is expected that the openpit operations will increase output materially.

★Judge John D. Lyons, Jr., began hearings in Pima County Superior Court on May 9 on the evidence of a complaint of illegal sale of mining claims by the Pima county supervisors. The complainant is Fred W. Fickett, attorney, who testified that he submitted bids on 15 claims placed on sale for delinquent taxes. At the time of opening the bids, he said, his offers were highest. Later, he continued, other bids were received and he was not given the opportunity to raise his of-

ters. The claims were then sold to a higher bidder.

The claims were listed as: Portland, Climax, Three B's, Indiana, Copperton, Actena, Carbonate, Summit, Townsite, Souvenir, Poland, Paddy Woods, Exposition, Homestake, and Kokomo. All are in the Silverbell district.

★The John A. Holmes Safety Association, made up of 29 leading national organizations representing the mining, metallurgical, and allied industries, has awarded certificates of honor for extraordinary achievements to the following Phelps Dodge Corporation divisions: New Cornelia Branch in Ajo; Drilling and Blasting Department of the New Cornelia Branch; Smelter Division of the United Verde Branch at Clarksdale. John Petsche, of Bisbee, received a special award for saving the life of a 12-year-old youth by removing him from high-tension wires.

NEVADA

Copper Canyon Co. plans open-pit mining at Copper Basin—Equity tunnel reopened in Austin area

★Goldfield Consolidated Mines Co. made no production from its Goldfield and Aurora mines in Nevada during 1945, but Secretary J. J. McCormack reports from the main Reno office that sales of war materials from its California industrial plants aggregated $14,400,000 prior to V-J day. The remainder of the year was given to problems of termination and reconversion. Unfilled government contracts approximating $13,000,000 were reduced by termination to $2,625,000, but because of labor strikes the plants were closed from Oct. 29 until after the end of the year. No estimate could be made of the postwar production or value of the Dalmo Victor and Production Engineering Co. divisions. The plants producing magnesium powder in San Francisco and grained aluminum at South Gate, with no apparent peacetime value, were liquidated. Net earnings were $650,811, or 16c. per share, compared with 5c. per share in 1944, and left $276,943 cash in hand. George Wingfield, of Reno, is president of the company.

★Copper Canyon Mining Co., at Battle Mountain, has increased mill feed to 320 tons per day, operating on three shifts, and in early June, with stopes prepared, its flotation mill will be at capacity of 350 tons. A mineral jig has improved gold recovery by at least 10 percent, according to Robert H. Raring, manager, and a new Eimco-Finley loader has been provided. On the company's Copper Basin properties, 6 miles north of the Copper Canyon mine, crews with earth-moving equipment have been benching the Carissa gold zone for a major open-pit operation. Six benches have been developed, and sampling, involving numerous prospect shafts and prospect drilling,

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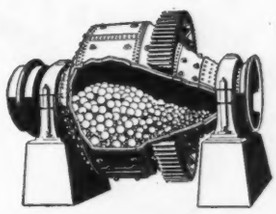

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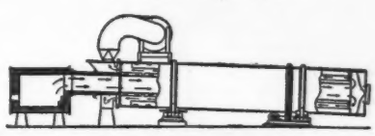

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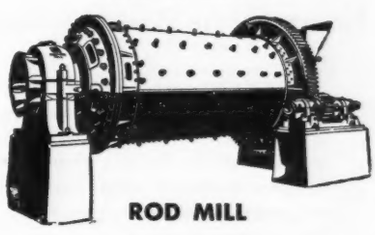

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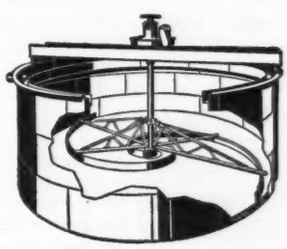

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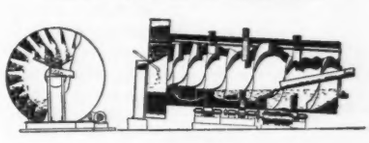

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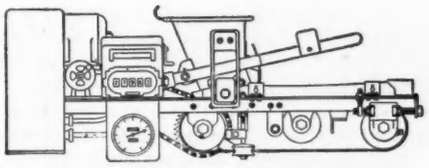

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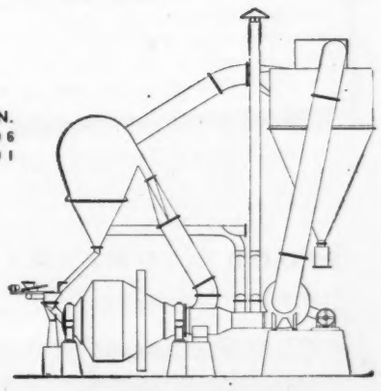

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Nevada *(continued)*

is said to have given satisfactory results, but it is desired to prove 2,000,000 tons of ore before planning a 1,000-ton mill. This area has been highly productive for lessees.

★Mountain City Copper Co., controlled and operated by International Smelting & Refining Co., Anaconda subsidiary, in 1945 had net loss before depletion of $14,389, compared with net income of 1944 of $141,946, or 6c. per share on the 2,371,427 shares outstanding. Gross income was $788,020 last year, copper deliveries aggregating 4,804,455 lb., against 9,624,357 lb. in 1944. F. A. Wardlaw of Salt Lake City, president, reported that manpower shortage increased during 1945, that no new discoveries of note were made, and that the ore reserve decreased by more than 50 percent during the year.

★National Lead Co., through its Baroid Sales Division, is producing barite from deposits in northern Eureka and Lander counties and near the Potosi district in eastern Humboldt County, and is reported to have accumulated a 10,000-ton stockpile at Red House for rail shipment to its processing plant in southern California. Drilling equipment is being delivered.

★Properties adjoining and covering extensions of veins on Lander Hill, at Austin, where a large production of silver was made in the '70s and '80s, have been acquired under long-term lease-option by the newly organized Nevada Equity Mines Co., headed by officers of the Copper Canyon Mining Co., including Louis E. Whicher, president; Robert H. Raring, vice president and manager; and S. L. Sherman and Harry Lakes, of New York. A mine crew is reopening the old 1,700-ft. Equity tunnel, which crosscuts seven veins, with seven more known veins ahead of the present face. Cutting the system of rather narrow fissures well below old workings in adjoining Austin-Manhattan ground, the tunnel will be driven to cut the Panamint vein, most productive of the Austin or Reese River district, which is credited with more than $51,000,000 silver output prior to 1920.

★International Mining Corporation, of New York, operating the long productive Groom lead mine in western Lincoln County in association with Dan Sheahan, who is in charge, reports 1945 profit of $17,640, but net loss of $11,571 after depreciation and depletion. Churn drilling to the extent of 2,429 ft. failed to expose new orebodies of importance, and 750 ft. of development work was accomplished. The mill was operated for only a few days, and shipment of crude ore to the Caliente rail point, 92 miles distant, was halted by shortage of labor and truckmen.

★Consolidated Coppermines Corporation, Kimberly, reports 1945 net earnings of $435,877 after taxes, with distribution of $317,673, or 20c. per share, in dividends. Metal sales, with premium payments, brought gross income of $1,206,508 and $175,000 was allocated for federal taxes. At a recent meeting dividend No. 21, of 10c., was declared. C. I. Cook is manager.

★Tonopah Mining Co., of Nevada, reported cash receipts in 1945 of $327,667, disbursements of $290,361, and a year-end cash balance of $63,989.97. Income derived from lease production at the Tonopah mines was small, as work was halted during part of the year by a destructive fire at the main Mizpah shaft. Chief revenue derives from investments in productive enterprises.

★Newmont Mining Corporation, through its Esmeralda operation, is conducting extensive work in the Goldfield district, having reconditioned the old Silver Pick main shaft to the 500-ft. level with the reported purpose of repairing the shaft to the 700-ft. point and driving long laterals at that depth. The company is said to have resumed diamond drilling in the northern area, where several holes were drilled last year. Newmont is reported also preparing for major-scale development in the old Bullion or Railroad district, southern Elko County. Equipment is being delivered by way of Elko by George Horn, superintendent.

★The Natomas Co., preparing for early operation of a 5,000-cu.yd. dragline dredge on the Greenan placers below Copper Canyon, Lander County, reports 1945 net income of $623,478, compared with $523,128 for 1944. Book loss on contract sales of land reduced net profit to $67,115 last year. In December a dividend was paid at the rate of 60c. per share, or $553,260. Gross returns from dredge operations in California, Nevada, and Colorado were $1,052,124 during the year.

★Prince Consolidated Mining Co., operating near Pioche, in Lincoln County, and shipping its product to the nearby flotation mill of the Combined Metals Reduction Co., had 1945 gross income of $255,071 with expenditures of $238,849 and net profit $16,222.

★Directors of the Southgold Nevada Consolidated Mines Co., at a recent meeting in Philadelphia, were said to have made provision for reopening the gold property at Eden Creek, south-central Nye County, enlargement of the 35-ton concentrator, replacement of buildings burned last year, and construction of a 10,000-ft. pipe line. Clyde R. Terrell, of Tonopah, is in charge.

UTAH

End of strike deadlock believed awaiting price relief—New Park and North Lily report for 1945

★The reported proposal of Paul Porter, Price Administrator, to increase copper prices 2.32c. a pound if pending strikes are settled on an 18½c. an hour wage increase, gives promise of

ending the 116-day-old strike involving 5,000 Utah employes of the Utah Copper Co., American Smelting & Refining Co. and United States Smelting, Mining & Refining Co., according to an opinion current May 16 following arrival in Salt Lake City of Robert C. Williams, of San Francisco, special Labor Department conciliator for the non-ferrous metal mining industry.

The conciliator sought to determine attitudes of the mine operators and union representatives toward recommendations of the special fact-finding panel as to wage increases, and to attempt to settle the strike. He met with both operators and union representatives separately and has been attempting to get the two parties together.

Officers of district No. 2, International Union of Mine, Mill and Smelter Works, CIO, representing the workers, have agreed with only some provisions of the wage increases recommended by the panel and have expressed desire for an out-and-out 18½c. per hour wage increase not pegged to establishment of a 40-hour week such as is recommended by the panel.

The operators have not announced their position, which is understood to hinge upon ceiling price relief now promised for copper and reportedly under consideration for lead and zinc. All three Utah companies involved are low-cost producers not affected directly by adjustments in premium prices such as were promised Anaconda Copper Mining Co., which enabled tentative settling of that strike.

Pay for clerical workers, terms of the annual contract for the year beginning July 1, 1946, and many other points still in dispute indicate that prolonged negotiations would be necessary before complete agreement could be reached.

★Striking workmen, meanwhile, won the legal decision that striking employable persons should not be discriminated against as compared with unemployable persons on state relief roles. On April 29 the State Welfare Commission adopted tentatively a resolution that assistance to employable persons, including those on strike, be limited to allowance for food, clothing, shelter, and fuel, not to exceed $29 per week per person unless specially authorized by the commission. Application of the resolution was held up pending decision by the Attorney General on its legality. The commission held that availability of part-time jobs and fraternal sources of aid can be counted among the relief candidates' resources and should be used in determining budgetary requirements. J. Frank Marble, president-secretary, District 2, International Union of Mine, Mill & Smelter Workers, countered in letters and advertisements, that the strikers were being discriminated against.

The opinion written by Herbert F. Smart, Assistant Attorney General, released May 9, in part reads as follows: "No minimum assistance and no maximum assistance in terms of

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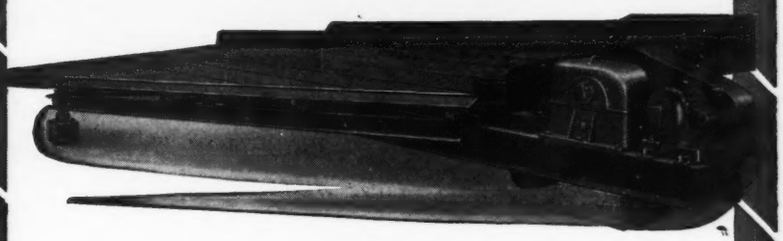

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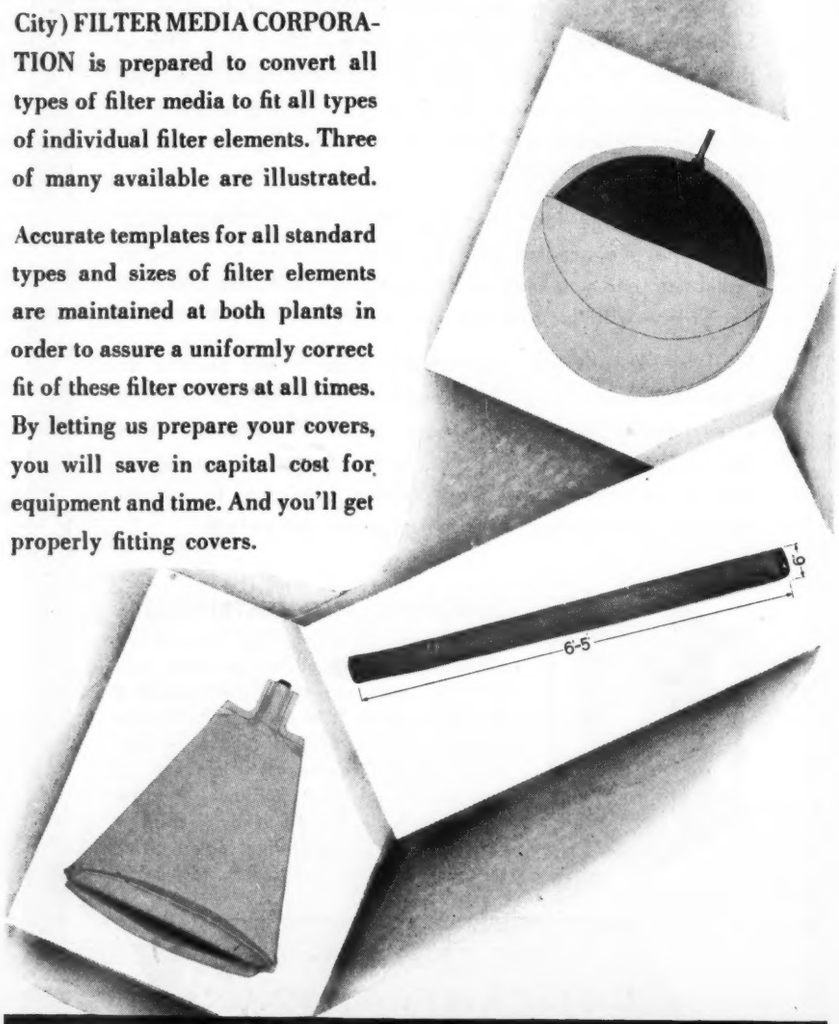

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Utah *(continued)*

dollars was provided for by the assistance to persons in necessitous circumstances. . . . The rule or standard by which the amount of grant is determined is the need of the applicant. You are, therefore, informed that if an employable person is in needy and necessitous circumstances and his needs of funds to meet everyday expense are the same as those of an unemployable person, he is entitled to equal assistance." The opinion held further that the welfare commission could require, as a condition for granting assistance to employable persons, that they register with the employment service seeking employment, but stated, "I am unable, however, to conclude that the welfare department may by resolution say that there is work available and upon such premise limit the maximum amount of assistance." Only if the applicant refused work offered him or refused to make diligent efforts to obtain employment would the welfare commission be justified in denying him assistance, Mr. Smart said. He held, further, that "welfare funds held by churches, fraternal organizations and labor unions . . . from which the relief applicant has no right in law to demand aid, may not be considered as a resource," but said such private assistance, after it is given, may be considered in making subsequent grants.

★J. W. Robinson, United States representative from Utah, was informed April 26 that the kalunite plant in Salt Lake City, closed for several months, has not been declared surplus and therefore is not on the market for sale or lease. RFC officials explained that the plant is in standby status because there are no indications that responsible prospective buyers or lessees are interested. Several weeks previously, J. R. Simplot of Pocatello, Idaho, superphosphate fertilizer manufacturer, accompanied by engineers, had visited the kalunite plant with the expressed intention of studying economic practicability for its acquisition and use for making treble ammoniated superphosphate fertilizer.

★Treatment and prevention of silicosis with aluminum dust was explained by Dr. M. W. Fish, Park City, at the April meeting of the Utah chapter, American Institute of Mining and Metallurgical Engineers. Burt B. Brewster, Salt Lake City, spoke on Ira B. Joralemon's address before the Idaho Mining Association on "The Have-Not Theory and Metal Prices."

★Utah's open-pit iron mining led the country in 1944 in number of long tons produced per man-hour, also recording the best safety record with no fatal accidents and the lowest number of non-fatal accidents, according to a U. S. Bureau of Mines report. On a production of 1,542,282 long tons, Utah mines averaged 7.60 tons per man-hour, compared with 3.73 tons in California, which had the next highest figure.

Utah had 9.86 non-fatal accidents per million man-hours.

Hampered by strikes and other difficulties, Utah iron-ore mines produced only 26,877 tons in February 1946, compared with 61,369 tons in the previous month.

★New Park Mining Co., Keetley, reported improved financial position on Jan. 1, 1946, despite reduced tonnage and income during 1945. Net income after federal taxes amounted to $259,-348, compared with $301,425 in 1944. Operating expense, at $867,907, was $63,094 less than in 1944. Dry tons treated totaled 50,043, compared with 57,639 tons in 1944. Recovery was as follows: gold, 13,780 oz., compared with 15,186 oz. in 1944; silver, 354,730 oz., compared with 449,929 oz. in 1944; copper, 726,519 lb., compared with 719,317 lb. in 1944; lead, 7,089,323 lb., compared with 8,005,804 lb. in 1944; zinc, 10,150,-280 lb., compared with 10,322,276 lb. in 1944. Net working capital increased from $274,780 to $353,208.

★North Lily Mining Co., subsidiary of International Smelting & Refining Co., had a 1945 net income of $64,113 before depletion, compared with a loss of $3,504 in 1944. Production from 14,360 tons of ore mined, compared with 13,944 tons in 1944, was as follows: gold, 9,040 oz., compared with 5,029 oz. in 1944; silver, 75,570 oz., compared with 58,054 oz. in 1944; copper, 31,902 lb., compared with 237,061 lb. in 1944; lead, 242,737 lb., compared with 48,929 lb. in 1944; zinc, 10,516 lb., compared with 25,551 lb. in 1944. Current assets amounted to $95,313, compared with $80,556 at the end of 1944.

★Senate appropriations committee approval of modification of the McCarran silver amendment to make treasury silver available to domestic industry at 90c. an ounce, which appeared to be assured April 25, occasioned no exuberance among Utah mining men. "It is a disappointment that the price for sale of silver has been set so low; however, it is an improvement over 71.1c. and to that extent will be helpful," A. G. Mackenzie, manager, Utah Metal Mine Operators' Association, commented. "The 90c. price is not sufficient to compensate mining companies for the increasing cost of production," he added. He saw no likelihood of the 18.9c. increase in price of silver causing any spur to production. "Higher prices for other metals found with silver will be needed to step up production," he asserted.

★Directors of Combined Metals, Inc., holding company in Combined Metals Reduction Co., on May 7 declared a dividend of one cent a share, totaling $20,000, payable June 10 to stock of record May 25. Two previous dividends of ½c. to 2¼c. per share had been paid since financial reorganization of Combined Metals Reduction Co., of which E. H. Snyder is vice president and general manager.

★The Utah district office, Civilian

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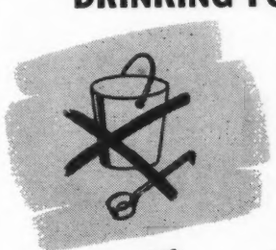

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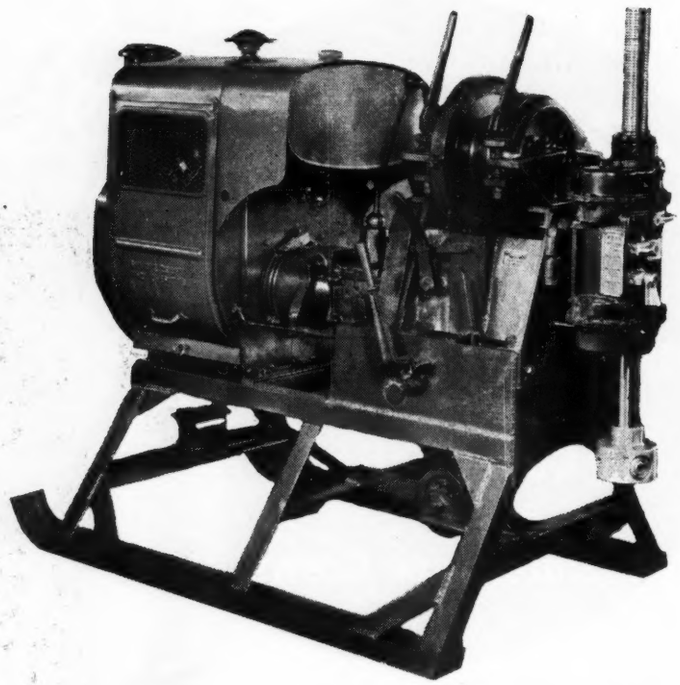

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Utah (*Continued*)

Production Administration, granted permission May 15 to American Smelting & Refining Co. to execute a $750,000 rehabilitation program at its Garfield smelter. William J. O'Connor, Utah manager for the smelting company, said the main items were replacement of boilers and installation of a 5,000-kw. generator and a new switchboard. The smelter rehabilitation program was planned some time ago, and many of the materials are on hand, he said. He explained that the job would have been completed but for the strike which started Jan. 21. Work will be started as soon as the strike ends, he said.

NEW MEXICO

Miners and Prospectors Association meets and drafts policies

★The New Mexico Miners and Prospectors Association held its first annual meeting since the war at Albuquerque on April 20 and 21. Horace Moses, general manager of Chino Mines Division, Kennecott Copper Corporation, and president of the association, presided over the meeting, which heard addresses on labor relations, underground resources, powdered metals, aerial photography as an aid to geology, and public land policies.

In a series of resolutions adopted by the meeting the association declared in favor of cooperation by government, labor, and capital in replenishing depleted ore reserves, elimination of waste and delay in labor-management relations, and encouragement of production programs. The theory that the United States has become a "have-not" nation in mineral resources was deplored. Elimination of subsidies and price controls of metals and minerals by June 30, 1946, was recommended. Opposition was recorded to any attempt to nationalize mines or to extend the government leasing system to cover lands valuable for metals and minerals.

COLORADO

Mahoning interests enter fluorspar field—Idarado plans for eventual 1,600-ton milling rate

★Colorado fluorspar mining properties, mostly closed down or operating at reduced capacity as a result of postwar slump in demand, continue to be absorbed as reserves by Eastern users and by Midwestern operators anticipating exhaustion of Midwestern fluorspar resources. Latest such transaction is purchase of the Wano fluorspar mill, at Jamestown, Colo., by Mahoning Mining Co., of Rosiclare, Ill., which in

turn is a subsidiary of Youngstown Sheet & Tube Co. A production of from 800 to 1,000 tons a month of acid-grade fluorspar is contemplated. Harry M. Williamson and son, of Denver, who sold the mill, have retained their fluorspar mining properties and will furnish the ore for operation of the mill.

★Employment in the mineral industries in Colorado stood at 12,800 in February 1946, compared to a maximum of 15,900 in January 1943 and a 1939 average of 14,000. The decline was almost entirely in metal mining. Despite the rescinding of L-208, production of gold and silver in Colorado in 1945 was the lowest in many years. However, gold deposits at the Denver mint in April 1946 totaled 40,487 oz., compared to 3,843 oz. in April 1945. The mint received 9,549 oz. of silver in April 1946, compared to 2,258 oz. in April 1945.

★Stearns-Roger Mfg. Co., of Denver, is working on an order to design and erect a plant of semi-commercial size for the chemical production of iron powder of 99 plus percent purity. The order is from the Iron Range Resources and Rehabilitation Commission of Minnesota, and the plant will be erected near Aurora, Minn. It is believed that this is the first chemical plant of any size designed to make high-purity iron powder by a process other than electrolysis.

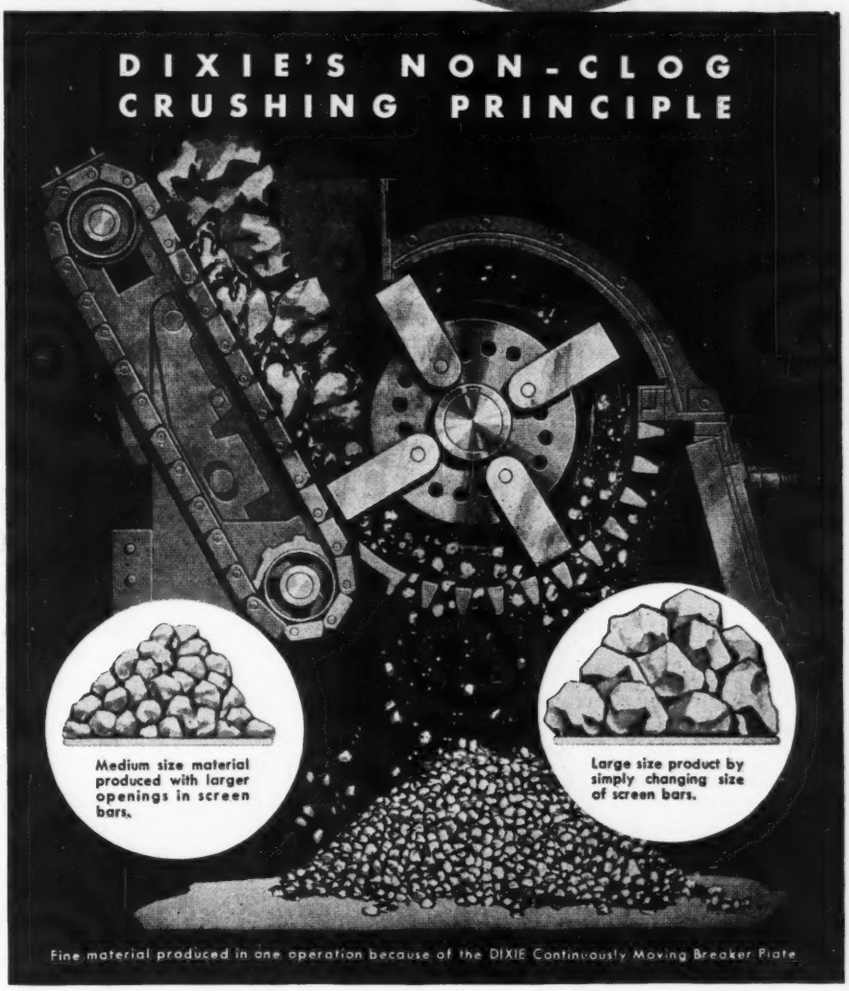
★A new ball mill is being installed at the Treasury Tunnel property of Idarado Mining Co., between Silverton and Ouray, which will raise milling capacity to 800 tons of ore daily, from the present rate of 300 tons. According to Idarado officials, the ultimate plan is to install 1600 tons of capacity. The new 500-ton mill is waiting for electrical equipment. The manpower situation at the mine is becoming slightly easier.

★Considerable new activity is evident in the Idaho Springs area. A. F. Mayham, of Empire, is preparing to reopen the Oriental Tunnel. Jack Downs, of Denver, is working on a reorganization of the Homestead Leroi Co. to operate the Edwards group of mining claims between Fall River and Trail Creek Gulch, near Idaho Springs. E. G. Fye, Jr., is sinking a new shaft at the Brooklyn group of mines, near Central City. About 10,000 tons of the Dixie dump will be run through the Hoosac mill west of Idaho Springs, operated by Arthur Portenier and associates. Chan Weaver is opening the Beysant mine, in Leavenworth Gulch. Lupton Mining Co. has bought the Mineral Chief mine.

★Richard Charles King, of Colorado Springs, president of Alma Mill, Inc., is preparing the Record mill to operate on custom ores from mines and dumps in the Alma district. N. P. Otis and associates, of Denver, owner of the Weber group of claims, on Mount Bross, above Alma, have leased three of the claims to Ralph Luckenbach, of Denver. Ed. Moynahan, of Alma, is in charge of development work.

★A crushing plant has been installed

TAKE A LOOK AT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MOST DRILL REPAIRS are handled underground at King Lease, Inc., which operates the old Camp Bird mine, near Ouray, Colo. Shown above in the shop on the mine's "14" level are Andrew Bassett (left), shift boss, and Roy Riley, who runs the shop. Miners bring in drills for all repairs; they have replacement drills ready in stopes to prevent interruptions in mining.

Colorado *(continued)*

at a scoria outcrop on the Denver & Salt Lake Railway in western Colorado. This volcanic obsidian, along with pumice, also a volcanic lava product, is coming into increasing use as a constituent of cinder and cement building block in the western states. Inspectors of the State Mines Department are looking for other deposits near shipping facilities.

★On Feb. 25 last most employes of the American Smelting & Refining Co.'s Arkansas Valley smelter, at Leadville were laid off because of a lack of ore. A small force was kept at work preparing the mill for resumption of activity, and stockpiling ore.

The latter workers went out on strike with other AS&R employes the country over, and on April 3, the company published an advertisement offering work to all. The Industrial Commission has heretofore held that those who went out on strike are not entitled to unemployment compensation. Now, after a hearing in Denver, it has held that those who were laid off Feb. 25 are not entitled to unemployment compensation after April 5, since their failure to return to work comes under the heading of a labor dispute. The decision also applies to benefits under the Veterans' Reemployment Act.

★Unusually good ore has been opened on the 2,700-ft. level of the Ajax mine, at Cripple Creek, owned and operated by the Golden Cycle Corporation, in the area of deep workings drained by the Carlton tunnel. Officials describe it as "The best body of ore discovered in the district in ten years." It is being exposed by drifting. Thus far lateral development totals over 1,500 ft. Vertical extent is not known. The Ajax shaft is 3,700 ft. deep.

Indicative of values in the new ore are assays of two recent carload shipments. One car, consisting of coarse ore, ran three ounces gold per ton. A second carload, made up of screenings, assayed eight ounces gold per ton.

Lack of miners in the Cripple Creek district is reported to be hampering potentially larger production of relatively high average grade ore from the Ajax property.

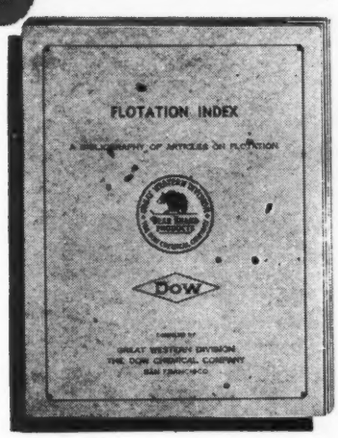
TEXAS

Wartime iron-ore beneficiation plants at Daingerfield, Linden, and Jacksonville are idle

★The iron-ore plants of the Sheffield Steel Corporation, at Linden and Jacksonville have been closed since Sept. 1, 1945, and are being maintained in a stand-by condition. The plants went into operation in the fall of 1943, and the blast furnace started in April 1944.

(*Continued on Page* 136)

16th ANNUAL ADDITIONS FOR THE FLOTATION INDEX



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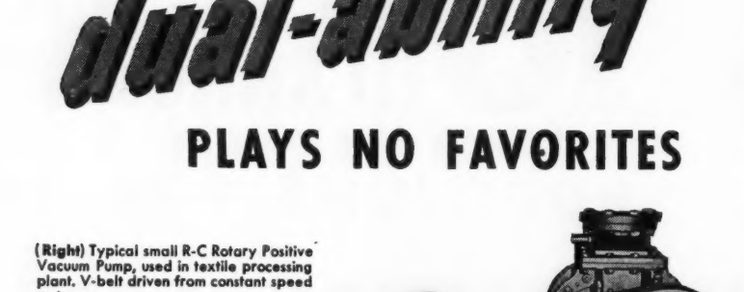

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Texas *(continued)*

The blast furnace was operated for the company's account until Jan. 31, 1945, when a shutdown became imminent because of the high cost of coal and the availability of scrap as a raw material. However, the pig-iron situation again became acute, and at the request of Defense Plant Corporation the company operated the plant for the government from Feb. 1, 1945, to Oct. 6, 1945. Notice to discontinue operations was given the company shortly after V-J day, and most of the materials were liquidated by October.

Costs at the Linden plant are said to have run somewhat higher than expected, but at Jacksonville were considerably below estimates.

★The plant leased from the government by the Lone Star Steel Co., at Daingerfield, has never been operated. It has a rated capacity of 438,000 tons of pig iron per year, with the byproduct coke plant and ore beneficiation facilities. It is able to treat 800,000 tons of ore and produce about 400,000 tons of coke per year in addition to the pig iron. The original plans called for open-hearth furnaces, blooming mills, and plant mills.

It is reported that the same strong pressures that caused the construction of the plant are being exerted to keep the operation alive.

TRI-STATE

Producers ask premium price plan continuation—WSB approves new Eagle-Picher wage schedule

★In a statement presented to the Senate Banking and Currency Committee April 24 in Washington, in support of the price control extension measure (S-2028), O. W. Bilharz, of Baxter Springs, president of the Tri-State Zinc and Lead Ore Producers Association, pointed out that the economical recovery of large district ore reserves is dependent on the continuation of the premium price plan for copper, lead, and zinc.

"Without the premium price plan the mines will be forced to shut down," he declared. "Once the field is down and pumps are stopped, the mines cannot reopen at any reasonable price. Therefore we believe that maintaining production in this area is, in effect, conservation which justifies continuation of the premium price plan.

"Large marginal ore reserves of zinc and lead exist in the Tri-State area. In January 1946 the U. S. Bureau of Mines brought its survey up to date, showing that there remain 50,735,000 tons of crude ore which the Bureau's engineers estimate will average 1.75 percent metallic zinc and 0.23 percent metallic lead, or the equivalent of 785,000 tons of zinc metal and 125,000 tons of lead.

"An active industry is now in full operation in the Tri-State area ready to recover these large ore reserves efficiently. The current investment there represents nearly $20,000,000, supporting a labor and managerial force of some 6,000 men and many allied industries. It is impossible to shut down and reopen mining operations at will. The necessary capital and equipment must be continuously engaged or the organization will be dispersed and the necessary talent of 'know-how' will be dissipated.

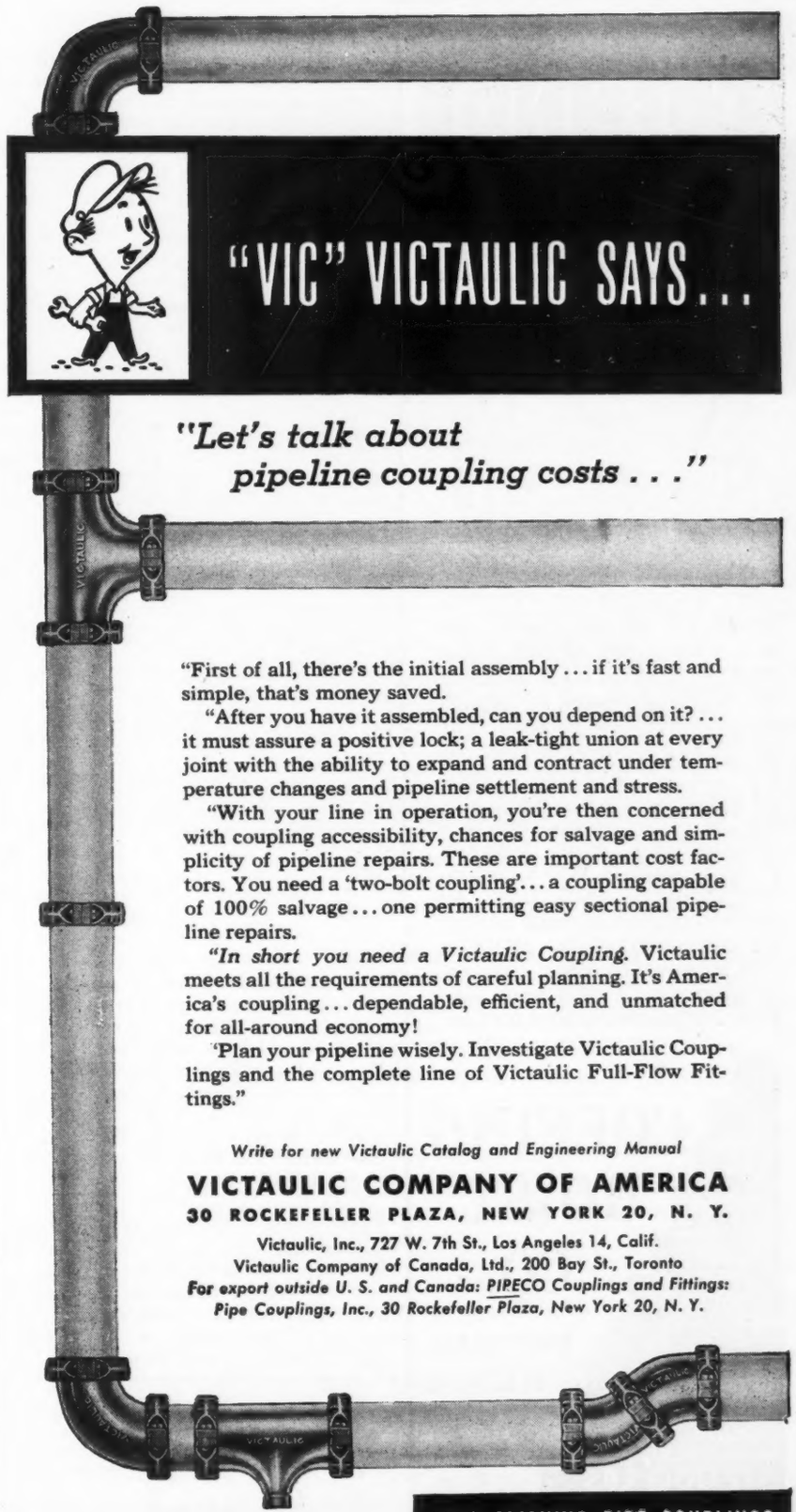
"The loss of these reserves will result in a tremendous and unjustifiable waste of the nation's mineral resources. Unless the operations are continuous, flooding and caving are inevitable, and the great bulk of these reserves will be lost forever. These hazards are particularly prevalent in the Tri-State field, where the mines are comparatively shallow and the mining operations are interconnected."

★Eagle-Picher Mining & Smelting Co. was advised on April 17, by the Kansas City Regional Wage Stabilization Board, of approval of a $1 a day wage increase to all hourly employees of the company in the Tri-State district, which becomes effective April 12. Between 50 and 75 other companies operating in the field filed applications for a similar wage increase. The avowed intention of Government agencies is to cover the increase by subsidy payments instead of permitting increases in ceiling prices of metals to offset higher production costs.

The dollar hike brought the daily wage rate of district miners and millmen to a new high level. The base pay of machine men was increased from $7.05 to $8.05 a day, with millmen receiving a somewhat similar wage. The last general wage rise in the mining field was negotiated in panel hearings in August, 1943, and amounted to 50c. a day.

For unionized companies in the Tri-State field, the International Union of Mine, Mill and Smelter Workers (CIO) demanded an 18½c. per hour increase and a 40-hour work week, which would bring the $7-a-day individual's wages to $42.40 a week, whereas a similarly paid employee of the Eagle-Picher company already is getting a take-home pay of $52 on the basis of a 48-hour work week, with time and one-half for the sixth day, or the 8 hours over 40.

Local CIO unions voted to serve 30-day notice on the Labor Department of intention to strike at district mine properties of the Federal Mining & Smelting Co. at meetings held April 23 at Picher, Okla.; Treece, Kan.; and Duenweg and Granby, Mo. According to union officials, the action resulted from a breakdown of negotiations for a wage increase of 18½c. an hour for union employees, requested by the union. Notices of the intended work stoppage were sent to the Wage Stabilization Board, the NLRB, and the Department of Labor. Three companies, namely St. Louis Smelting & Refining Co., Kansas Explorations, Inc., and the Ri-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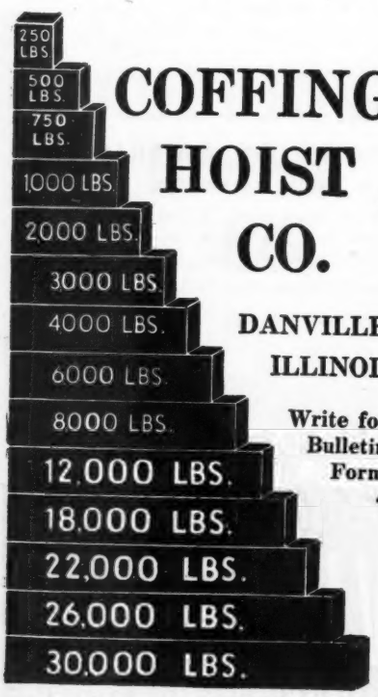

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Tri-State *(continued)*

alto Mining Corp., whose employees are already unionized, had agreed to the 18½c.-an-hour wage increase. They employ between 800 and 900 men.

The upward adjustment of $1.48 will bring the basic rate for unionized machine men to $9.03 per shift. A union official pointed out that the companies can elect as to whether they want a 40-hour or a 48-hour work week, although the union favored the former. Following the announcement of these agreements, 75 miners employed by the Scott Mining Co., east of Hockerville, Okla., staged a one-day strike, but returned to work the next day. An election to determine whether or not the union will become the bargaining agent for employees of this company was set by the National Labor Relations Board for May 16. Employees of the Evans-Wallower Zinc, Inc., operating the No. 4 tailing plant near Cardin, Okla., voted 42 to 5 in favor of a 48-hour work week, instead of one of 40 hours, in a voluntary election conducted May 10. Three of the 50 employees did not vote. The balloting was conducted also to show the preference of the men for the 48-hour week, including a 12½c. wage increase, arbitrarily put into effect by the company last March 29, and the implication of a 6c. additional pay hike on the basis of the 40-hour work week.

For the first payroll period ending in May, the St. Louis S. & R. Co. put into effect a 40-hour work week with an 18½c. increase in the hourly wage scale. It was understood that this schedule of work week and pay increase, agreed upon previously by the company and the local CIO union, had not been approved by the Wage Stabilization Board. Similar agreements entered into between local unions and the Federal (cancelling previous work stoppage notice), Rialto, Kansas Explorations, and the M. & W. Mining Co., have, at latest report, neither been put into effect nor have the applications to WSB been approved.

Date for a hearing on a petition by Eagle-Picher employees for an NLRB election has yet to be announced. It was reported authoritatively that it had been decided to hold an election for both surface and underground employees of the company when the hearing is held and a date is set.

ARKANSAS

Former diamond-producing area is under magnetic survey — North Arkansas zinc district active

★An extensive magnetic survey is being conducted by two Eastern firms in the Pike County diamond fields, which have not been worked in recent years. Although the purpose of the current activity is not known, the firms are collaborating in conducting a magnetic survey of the diamond-bearing peridotite plugs where diamonds were first discovered in 1906 by John Huddleston, of Murfreesboro. The first diamonds found in North America came from this section, and the Smithsonian Report of 1923 said that approximately 10,000 gems were taken from the field. Mining was continued for several years.

Ali A. Hassan, a New York City consulting engineer and geologist, and Sherwin F. Kelly Geophysical Services, Inc., of Wilmington, Del., are participating in the survey.

The U. S. Bureau of Mines carried on a drilling and exploration project in the area during the war, but results have not been made public.

★Lewis Flader and associates, operating Mine 16, on Brushy Creek, Marion County, are sending ore through their new 50-ton mill. Wm. Flader has reportedly worked out a process to separate cadmium from carbonate zinc ore. Fayti Hand is mine foreman, and Paul Turney is engineer.

★Ed Zimmerman, in charge of operations at the Maumee mine, Searcy County, for the Bank of Farmington, Farmington, Mo., has a shaft down in the ore zone. Ten acres were drilled and each hole reportedly showed high-grade zinc from about 80 to 110 ft.

★Operations will start on the Mattie May mine, near Rush, Marion County, in May. A group of mining men from Carlsbad, N. M., has organized the Mattie May Mining Co. Luther V. Nelson is president and general manager and Pat McCormick is foreman. A vein of high-grade sulphide zinc ore occurs on the property.

★During recent weeks the Milwhite Co., of Houston, Tex., has had two core drills of the Sullivan Machinery Co. doing test work on its barite property in Montgomery County. The company is said to have ordered three new core drills to use in carrying on further exploration. Albert Hess, of Little Rock, is in charge of the work for the Milwhite Co.

The Magnet Cove Barium Corporation, of Malvern, is actively engaged in surface mining operations on its Gap Mountain barite property near Hopper, in Montgomery County. Overburden is being stripped from one of the orebodies preparatory to open-pit mining operations.

Harry Brown, of Malvern, is vice president and general manager of the company, which is producing large quantities of magcobar, weighted oil-well drilling mud, from another property near Magnet, in Hot Spring County. The ore from the Gap Mountain property will be shipped to the company's plant at Malvern.

★Production of manganese ore in the Batesville-Cushman field dipped to a low level during April. Some operators have closed down and will stay closed until after the stockpiling bill is settled in the House. Rain also cut production

in April. Total production ran to approximately 470 tons, of which 195 tons were high grade and 275 tons low grade. Walter H. Denison Manganese Co. was the largest producer, most of the ore coming from properties held in the Pfeiffer area. The Polk-Southard Mining Co. was in operation only two weeks.

★Stanley Bourne and Ernest Stroud, both of Batesville, operating the Austin mine, near Mount Pleasant, Izard County, expect to be in production soon, after overhauling power dragline equipment. The Austin mine is the only pyrolusite mine in the Batesville-Cushman field.

MISSOURI

Local sections of A.I.M.E. hold spring meetings

★The Fredericktown Lead Co., of Fredericktown, in Madison County, is reported to have discovered a new orebody adjacent to the Mill shaft. The discovery was made by churn drilling.

★The St. Louis section of the A.I.M.E. held its annual Rolla meeting at the Missouri School of Mines on May 4. Out-of-town members from the Tri-State region, southeast Missouri, and Illinois were in attendance in addition to members from St. Louis and Rolla. Official activities during the all-day meeting included inspection of the U. S. Bureau of Mines facilities in Rolla, the mining department of the School of Mines, and the multiplex unit of the U. S. Geological Survey. Following a dinner in the evening the 160 assembled members and guests heard a discussion of atomic energy delivered by Dean Henry Bent of the Graduate College of the University of Missouri.

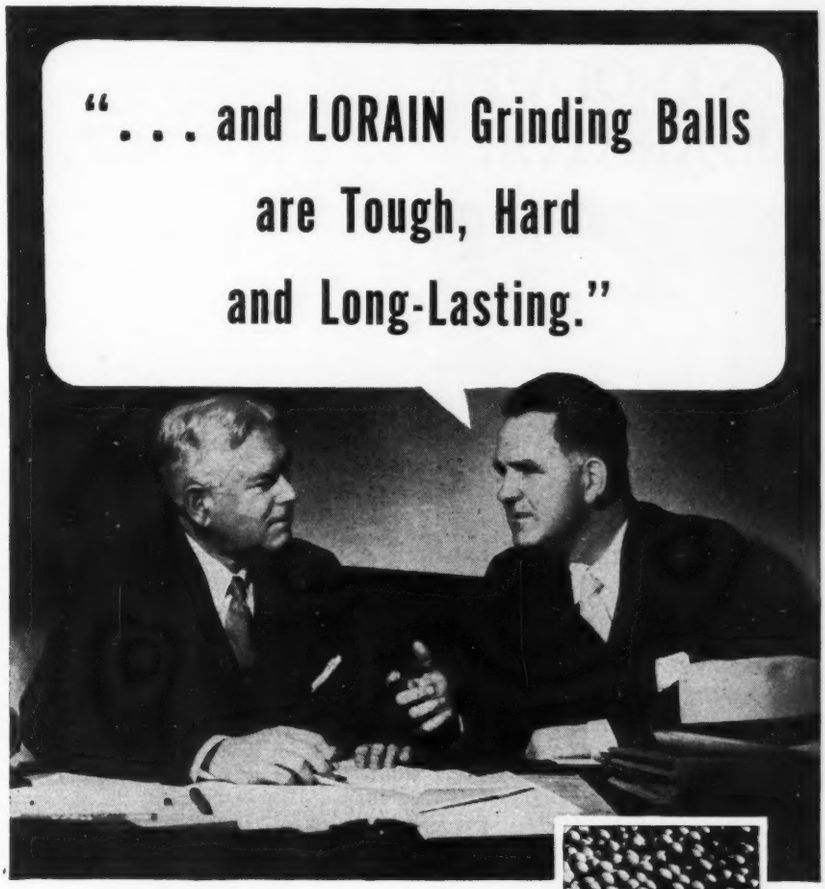
★L. S. Cates, president of the American Institute of Mining Engineers, addressed a large dinner meeting of the A.I.M.E. in St. Louis on May 20. Mr. Cates, president of the Phelps Dodge Corporation, spoke on "Some Big Metal Mines and How They Were Found." Institute members were present from Rolla, Bonne Terre, Rivermines, Centralia, Urbana, Fredericktown, and Joplin.

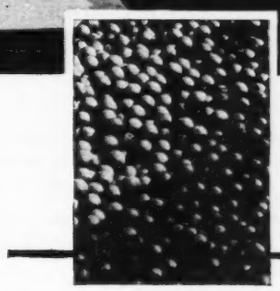
ILLINOIS and KENTUCKY

Inland develops Rock Candy Mountain mine—Mineral Flotation Corporation leases properties

★New shafts are being sunk on two Hardin County mining properties. Crystal Fluorspar Co. on April 16 started sinking a 300-ft. shaft on the Jefferson lease, and Mahoning Mine Co. is sinking a 312-ft. shaft on the Deardorff property.

★Exploration and development work





To resist the severe abrasive action of long, heavy runs; to stand up under continuous pounding; to cut grinding costs, you will find it practical and economical to use Lorain Grinding Balls in your mills.

They are forged from new steel with surface hardness to withstand abrasion and a resilient core to cushion the shock of impact.

Lorain Grinding Balls are available in the following diameters (inches):
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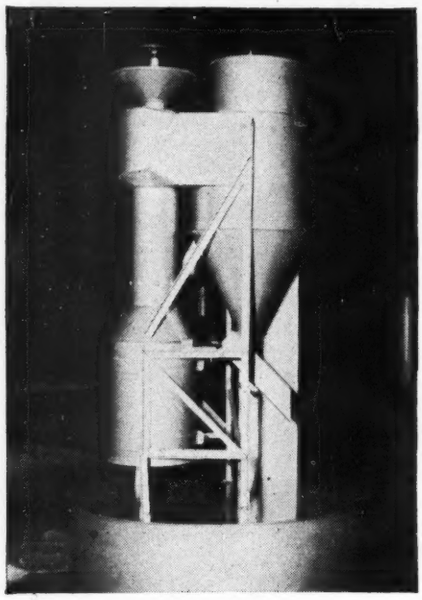
CONTROLAIRE SEPARATOR



LABORATORY MODEL

The "S. S. & S." CONTROLAIRE SEPARATOR has two functions:

First —to separate a mixture of properly sized materials one from the other;

Second—to remove fines from homogeneous materials.

The CONTROLAIRE will separate materials which are too fine to be properly separated on the Sutton, Steele & Steele Air Table. A Sutton, Steele & Steele Air Table will separate in the range of ¾" down to 48 mesh. The CONTROLAIRE will separate properly sized material from 30 mesh down to 250 mesh.

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Illinois and Kentucky

(*Continued*)

was begun by Inland Steel Co. at the Rock Candy Mountain mine in April. The property, in Pope County, Ill., recently was acquired by Inland on lease from the Big Creek Mining Co.

★Properties of the Senator and Meadows fluorspar mines, in Caldwell County, Ky., were leased recently by the Mineral Flotation Corporation, headed by P. J. Bertelsen, of New York, which began operation of a new flotation mill at Marion last November. Installation of a sink-and-float plant at the Caldwell site, near Princeton, is planned. The mill, which handled reclaimed sand waste, was shut down in May by the coal shortage and freight embargo. There are 1,000 tons of finished ore and 12,000 tons of crude ore on hand, according to Robert Swishes, plant superintendent.

★A general fluorspar, lead, and zinc reduction plant of large capacity, erected last year near Salem, Ky., by Alco Minerals, Inc., has advanced steadily into production. The company purchased the old Summers property and erected its flotation plant to handle low-grade materials gathered from dumps, old workings, and mines of low-grade output. Albert Melhman, of Marion, is president of the company, and I. W. Andrews, superintendent.

MICHIGAN

Copper Range continues testing of White Pine deposit—C. & H. sees end of Lake Linden dredging

★Mine production by Calumet & Hecla Consolidated was suspended on May 10 as the result of a coal shortage. The company's reclamation plants closed on May 12. The smelter remained in operation. Only the most vital construction and maintenance work was continued, including operation of the Lake Superior pumps which supply seven communities with water, operation of mine pumps, and shaft repair work at Ahmeek and Centennial.

The company did not require employees to take vacations during the layoff, but planned to issue vacation pay checks. Employees on the payroll from one year to five years are entitled to one week's vacation, and those employed for five years or more are entited to two weeks. About 2,000 men were affected by the shutdown.

★The Copper Range Co., which suspended mining operations on Sept. 20, 1945, began on May 8 to pull the underground pumps. This will make the shutdown permanent. Since the mine closed, the shafts have been kept unwatered and all essential maintenance work has been carried out. Dismantling will require about three months, as there are several electric hoists to be removed and considerable dewiring to be done.

Abandonment of the mine is considered a blow to the district, particularly to the South Range area. More than 700 men gained their livelihood through employment by Copper Range, and there was hope that the property would be reopened. The uncertainty of better prices for copper, however, apparently convince the management that the situation was hopeless.

The company explains, in its annual report, that it operated under special price agreements for copper with the Metals Reserve Co. and other federal agencies from September 1941 until Aug. 31, 1945. Efforts to extend the agreements beyond that date were unsuccessful.

During the period from September 1941 until mining was discontinued, wages were increased by more than 60 percent, and the cost of materials and supplies increased substantially. As a result, the company found it impossible to produce copper without incurring substantial losses. In appreciation of obligations to its employees, returning servicemen, and stockholders, the company made every effort to continue the operation of the mines, mill, and smelter.

The company made application on Sept. 1, 1945, for reinstatement of the 17c. price for copper under the Premium Price Plan, and formulated a plan whereby it was felt that it could continue to operate without sustaining severe losses. This included the abandonment of practically all development work, and a proposal to the union with respect to work-week schedules, vacations, and shift differentials. This proposal was rejected by the union. and the mines were closed after substantially 48 years of continuous operation.

One encouraging aspect of the Copper Range situation is that exploration of the White Pine property, in Ontonago County, is being continued. The drilling program as planned was completed before the end of 1945. An exploratory shaft, known as the Bill Schacht shaft, in honor of the former president and general manager, was started last June and progress by the year end was satisfactory. This shaft, when completed, will permit work on the formation which should give valuabe information with respect to underground conditions.

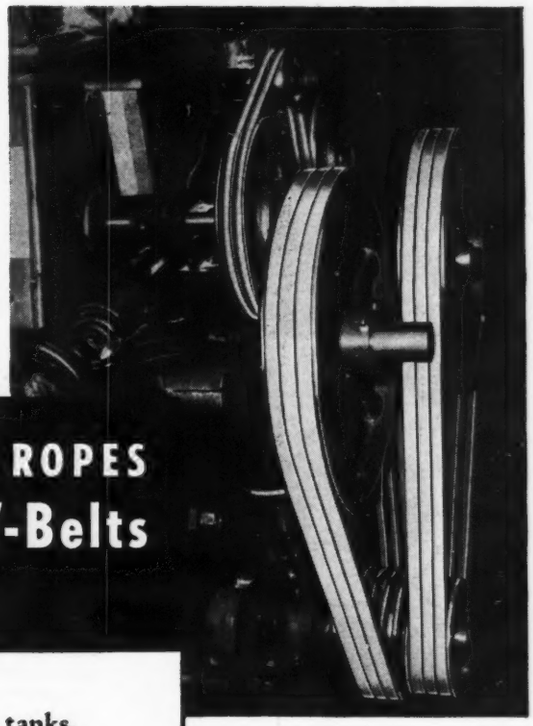
The Copper Range railroad will continue to operate. Because of the reduction of tonnage last year and an increase in labor cost, the railroad company lost $65,206 in 1945, compared to a profit of $21,530 the previous year.

★Rising prices of supplies and higher wages have made operations in the amygdaloid tailings deposit of Calumet & Hecla at Lake Linden unprofitable. This, says A. H. Wohlrab, general manager, is indicated by costs averaging 15½c per pound of copper, resulting in a loss of $20,000 for the four months' period from December 1945 to March 1946, inclusive.

With the full knowledge that the amygdaloid sands will continue to de-

(*Continued on Page* 142)

Here's an important fact



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Michigan *(continued)*

crease in copper content as the dredge moves into more recently deposited material it is apparent that the 18½c. per hour wage increase and the additional cost of coal, steel, and other supplies granted, or to be granted, by OPA, will increase the cost per pound of copper at least 3⅜c. This will no longer permit profitable operation of the plant, even at 22c. per pound for copper, which is the maximum obtainable under the amended Premium Price Plan.

About three months of dredging remained to be completed in comparatively high grade conglomerate sand which is deposited along the shore line and under the mill buildings, after which the Lake Linden operations will be closed permanently.

IRON COUNTRY

Miners' strike enters fourteenth week—Violence marks attempts of non-union men to work

★The strike situation has provided the most important if not the only news from the Marquette, Menominee, and Gogebic ranges, as all of the mines are underground operations. Operators of these mines are unable to meet the demanded pay raise of 18.5c. per hour. Management and labor are failing to get together, and the union miners are restless. The CIO officials have imported outside assistants, who are directing the strikers to go as far as possible and still keep out of the hands of the police. The few union members needed at the mines for pumping and other maintenance work have been withdrawn by union officials, and the few independent workmen who dare go to the mine for work have had their cars tipped over and smashed with rocks.

On May 9, when the shift ended at 3:00 p.m., about 40 union cars chased some independent workers from the Mather mine to West Ishpeming, about two miles, and upset a small truck after two attempts. After each attempt a shot was fired over the heads of the workers; when the truck went over, a third shot struck one of the spectators in the leg. The miner who fired the shots was arrested and arraigned on charges of carrying concealed weapons and assault with intent to do great bodily harm less than murder, but was released on $2,500 bail. The trial was set for May 20.

★On the Menominee range, the Iron County Board of Welfare revealed that the burden of providing food for families of strike-idle miners had exhausted county relief funds, and that the CIO union had promised to send them $30,000 each month as long as the strike lasts.

★At the latest meeting between mine

officials and the steelworkers, continuing from May 6 to 9, John Luecke, Federal Mediator, and James Greenfield, State Mediator, were present. The Cleveland-Cliffs Iron Co. offered a compromise plan of 12½ cents per hour increase plus a bonus of six cents for every ton of iron ore produced, the total to be divided equally between the employees, surface and underground, on the basis of hours worked during the year. The steelworkers refused to budge from their demand for a straight 18.5 cents per hour increase, and the strike went into its fourteenth week with little hope for early settlement.

In the meantime all of the underground equipment, including locomotives, cars, slushers, and rail, has been removed from the Princeton mine near Gwinn, Mich., and indications are that the mine may be flooded in the near future.

★Contracts have been signed with the CIO by all the companies operating in Minnesota with the exception of the Inland Steel Co., Butler Brothers, and the Cleveland-Cliffs Iron Co. The companies that have settled with the union on the 18½c. per hour wage increase represent approximately 85 percent of the total shipments from the Lake Superior district. It was expected that agreements would be reached with the three companies that have not signed by May 25, thereby ending a 15 weeks' strike of the miners.

ALASKA

Alaska Pacific Co. will resume operation of Independence mine—Placers active on Koyukuk

★Alaska Pacific Consolidated Mining Co., which owns and operates the Independence gold-quartz mine in the Willow Creek area, planned to resume operations about June 1 with a crew of 50 to 60 men, according to Henry Waechter, president. The mine was closed by wartime restrictions, and the program for this season will depend on the availability of labor. Phil R. Holdsworth, formerly with the Nabesna mine, will act as general superintendent, and John Hovland will be mine superintendent. The mine has produced more than $6,000,000 in gold.

★Alaska Miners' Association will hold its summer meetings at Fairbanks, Charles Johnston, president, has announced. At the association's last meeting in Seattle it was reported that men are scarcer than for five years for the large operations near Fairbanks, Nome, and Anchorage.

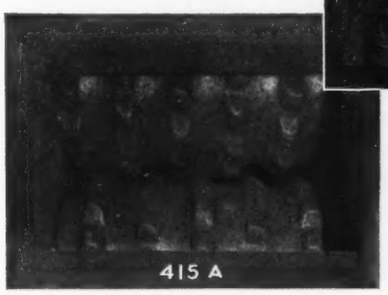
★Thunder Mining Co. opened its camp on Thunder Creek, in the Cache Creek district, in April, according to Fred D. Hougham, president. Charles Harper will superintend the hydraulic operations at the property.

★Larry Doheny, mining section man-

Manganese Steel Slugger Rolls Produced Double the Tonnage

The toothed slugger rolls of Amsco manganese steel which "show their teeth" in Picture 415-A, produced 529,000 tons of slag, at an average of 250 tons per hour—double the tonnage crushed by the ordinary steel rolls which they replaced.

Crushing and pulverizing operations demand rolls, shells, mantles, concaves, jaws or hammers that will resist the attack of hard, abrasive materials and do so economically. The verified answer to this requirement is austenitic manganese steel, as it gives by far the best service. In numerous applications of this type, "the toughest steel known" has proved to be the lowest in true cost—in terms of service per dollar expended.



Crusher and pulverizer parts were naturally among the earliest applications of manganese steel; for in this service the life of wearing parts was short and costs high for the steels previously used. The applications of these Amsco castings include the crushing of the hardest and most abrasive materials, such as quartzite, chert, flint, granite and glacier formations.

Today almost all crusher manufacturers incorporate manganese steel parts in their crushers, and many of them prefer Amsco manganese steel because of its uniform quality and availability from the seven Amsco foundries —coast to coast.

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● If you live near a large city, how long does it take you to reach the airport through traffic from mid-town? Or if your home is in a smaller town, how much time do you lose in getting to a point on one of the air lines? Fortunately, *helicopter* feeder-taxi service is being developed as the solution to these difficulties.

A notable flight is recorded in the picture above—the first direct helicopter trip from Philadelphia's Southwest Airport to a roof in the center of that city. Mail was picked up and delivered to a waiting Europe-bound air liner. The distance this helicopter flew is 4 miles. The flight took 4 minutes. By city streets the trip is 8 miles—*and takes 25 minutes!* Yet Philadelphia is fortunate in having its airport much nearer mid-town than most cities.

A helicopter takes off and descends vertically. Its landing area need be no larger than a tennis court. Its cruising speed, *straight across country*, is about 90 miles an hour.

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KELLETT
HELICOPTERS

Alaska *(continued)*

ager of the RFC, reports much placer activity on Koyukuk River. Several prospecting outfits, including John Repo and Jack Allen, will go out from Wiseman, on the Middle Fork of Koyukuk. George Bishop is leasing his property on John River and Crevise Creek, and machinery instead of hand methods will be used there.

★Alaska Drilling Co., headed by W. A. Peterson and E. J. Squibb, who have done considerable mineral exploration work in the Territory, has opened headquarters at Juneau. The company has announced that it will do all types of diamond core drilling, churn drilling, grout drilling, and foundation testing.

★Arctic Circle Exploration Co., at Candle, will have several gem cutters and polishers processing its jade before shipping it south. W. D. Stone is the company's new mining engineer.

★Taku River Gold Mines, Ltd., plans to deepen the company's winze to open two more levels at the Polaris-Taku mine, with the opening of navigation.

★Aluminium Company of America has started a local crew on preliminary work at its Edna Bay camp, according to E. E. Gillenwater. He said that because no local drillers were available a contract had been given to E. J. Longyear Co., of Chicago, and a twelve-man core drilling crew would be sent to Ketchikan.

★At a special session of the Alaska Legislature a tax act was passed, and became effective April 1, which includes a special tax of one-half of 1 percent on all miners' production payable by the exporter. This is for the Alaska veterans' benefit fund, and is in addition to the old gross tax on gold production in the Territory. There is no mention of such tax on commodities produced and sold in Alaska.

★Lytel-Green Construction Co., of Fairbanks, has been awarded a contract for completing a large storage dam for the Livengood Placers, at Livengood. Work on the dam was stopped by the war. It is estimated 100 days will be required for completion.

★Emil and Albert Swanson and Leo Saarela are starting a new placer operation in the Rampart district on Hunter Creek, a tributary of Little Minook. Work will start when a tractor, hydraulic equipment, and camp equipment are moved from Fairbanks.

★Active prospecting of a lode deposit near Medfra is to be undertaken by J. R. Storch. A tractor, compressor, and other necessary equipment are being assembled at McGrath and will be shipped to Medfra on the first available boat. Part of the equipment was flown from Fairbanks to McGrath.

★The Midnight Sun Mining Co. has sent two men to prospect on the company's ground on Wiseman Creek. Mrs. D. M. Wheeler of Vida, Ore., organized the company, which has staked 16 placer claims on Wiseman Creek.

★The Alaska Railroad river boats "Yukon" and "Nenana" were scheduled to leave Nenana on May 23 for the first trip of the season. The "Yukon" will run between Nenana and Circle every two weeks with mail and passengers, and the "Nenana" will make a round trip to Marshall every two weeks. Two other ships will be used on the Marshall run as business warrants.

The White Pass and Yukon will have two boats on the run between Whitehorse and Circle.

CANADA

Major companies join New Quebec prospecting effort—Malartic Gold Fields projects mill expansion—Polaris-Taku to resume

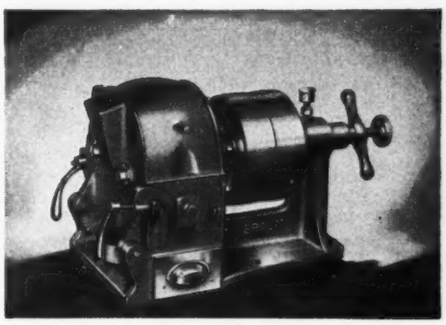
★An increase in base prices of copper, lead, and zinc at Ottawa is expected to follow closely the action to be taken in Washington by OPA. Prices available for Canadian metals in foreign markets are considerably above the level set by the Wartime Prices and Trade Board. The proposed U. S. increase in the price of silver to 90c. would have the immediate effect of boosting the price in Canada to 99c., in accordance with the arrangement by WPTB.

★Up to May 10 no progress had been reported in wage disputes at Noranda, Lamaque, and Kirkland Lake Gold Mines. Union organization activities had tended to weaken the labor position in some Canadian mining camps. An eight-point program was submitted to mine operators in several districts. In British Columbia, demands of the miners' union were described by operators as a threat to the industry which would result in closing "at least half of the operating mines" in the province, as well as greatly reducing exploration and development. In Manitoba, Hudson Bay Mining & Smelting Co. granted a 6c. increase per hour to miners; workers in the mill were given a 4c. increase on the afternoon shift and 8c. on the graveyard shift.

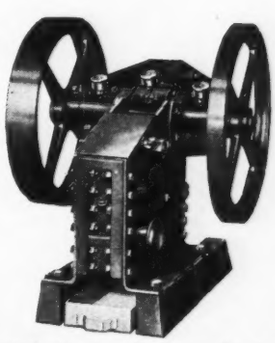
★Norancon Exploration, Ltd., has been organized to undertake prospecting in Labrador and New Quebec, being one of several companies planning to maintain parties in the field this summer. Norancon is being financed by Noranda, Conwest Exploration, and Anglo-Huronian, and announces that ten prospecting parties will be active this season. Labrador Mining & Exploration is committed to a program that provides for production of iron ore in 1956, and has set up a program of expanded operations for this season. Three aircraft are to service the program that starts about June 10. Four diamond drills are to be used in testing the various surface showings of iron ore. Dome Mines and several other operators will also place prospectors in Labrador and New Quebec this year.

(*Continued on page* 146)

FOR CONTINUOUS LABORATORY SERVICE



For high production and low maintenance in today's busy laboratories, the Braun Type UA Pulverizer is the logical choice. This simply designed pulverizer has powerful direct drive without gears, a minimum of moving parts, simple two-point lubrication, friction-reducing roller bearings, and a positive, rapid grinding action. Grinding plates are especially wear-resistant, and the machine can be cleaned with remarkable ease and rapidity.



Laboratory sample reduction becomes simple with the Braun Chipmunk Crusher. With a rated capacity of more than 800 pounds of quartz of ore per hour, it handles a wide variety of materials swiftly and completely. The Chipmunk, available for either shaft and pulley or direct motor drive with V-belt, is also made in a smaller size with a rated capacity of about 400 pounds of quartz of ore per hour.

Full information on these Braun Laboratory Labor Savers may be obtained by writing to Dept. E-6.

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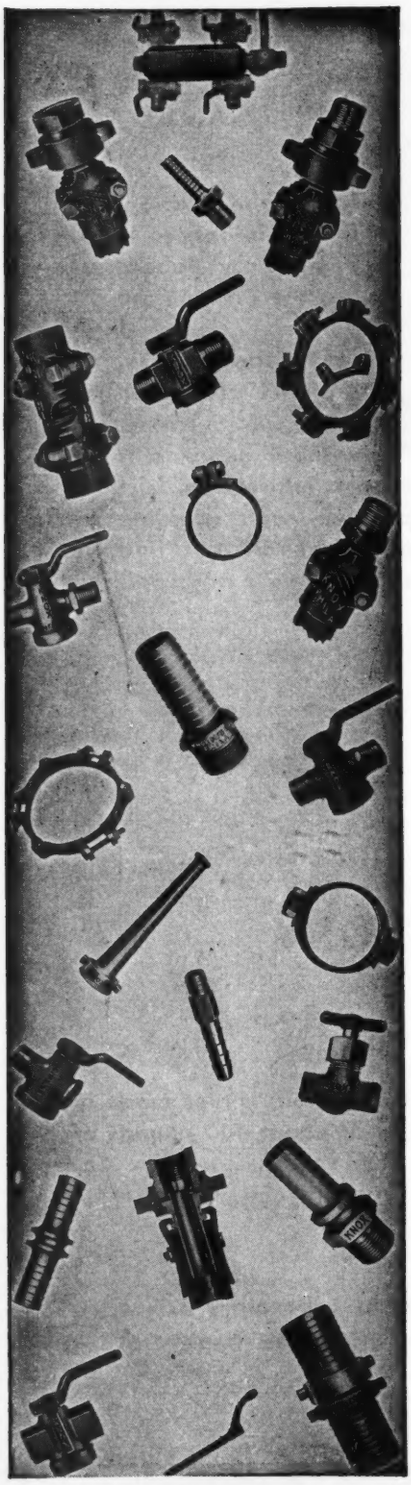

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Canada *(continued)*

ONTARIO

★Gold production increased 9.45 percent from 39 Ontario mines in the first quarter of this year, compared with the same period a year ago. McLeod-Cockshutt Gold Mines resumed production in February after shutting down in April, 1945. Magnet Consolidated Mines resumed in March 1946 after shutting down in November 1943. Hoyle Gold Mines shipped ore in March to the Pamour mill after shutting down in July 1943.

The ten major producers in the province, with output in the first quarter ranging from $2,254,678 down to $381,100, are in order of importance as follows: Hollinger, McIntyre Porcupine, Lake Shore, Dome, Kerr-Addison, Wright-Hargreaves Aunor, Sylvanite, Pickle Crow, and Pamour.

★Central Patricia Gold Mines and Conwest Exploration have acquired a substantial interest in Frond Lake Mining Co., where underground work is to be started later this year. Diamond drilling at Frond Lake has indicated an orebody of commercial proportions. The property is 110 miles north of the railroad at Nakina and 85 miles east of the Central Patricia mine.

★Teck-Hughes Gold Mines will complete in August the main part of the reconditioning program that was started last year, according to the president, Dr. D. L. H. Forbes. Encouraging results have been secured from diamond drilling and development at intermediate depth levels. Considerable ore remains in the upper part of the mine, but work is being concentrated between the 15th and 35th levels. Ore had been drawn above the 15th level in the war years. "Profitable operation for at least another decade" was stated to be indicated for the mine, which has paid dividends without a break since 1926. The milling rate is being determined by taxation and by conservation of positive ore reserves.

★Aunor Gold Mines in April milled an average of 462 tons a day, compared with 420 tons averaged in the first quarter. An addition to thickener facilities is intended to expand capacity in excess of 500 tons. New ore is being developed on the 1,625, 1,875, and 2,125-ft. levels. It is planned to mine straight through from the 1,875 to the 1,625-ft level. Stanley S. Saxton is manager.

★Coniaurum Mines has been delayed by labor shortage in attaining the normal milling rate of 525 tons a day, according to Thayer Lindsley, president. Promising unexplored areas north and south of the shaft are to be opened as soon as miners are available. Lateral development is in progress on all levels below 4,400 ft., with chief attention given to the 5,500-ft. horizon. J. Redington stated at the annual meeting in May that 35 percent of the ore drifted on had been in porphyry, which changes in character below a depth of 4,750 ft.

QUEBEC

★Malartic Gold Fields, Ltd., is preparing for a major construction program leading to increase of mill capacity to about 1,400 tons a day and installation of a new surface plant at the No. 2 mine. This is 3,000 ft. west of the No. 1 shaft. A 115-ft. headframe will be erected, equipped for 6-ton skips. In addition to a new mill building for a 750-ton unit, the program includes a crusher house, conveyor shed, hoist house, dry, and boiler and compressor houses. The new installation is expected to be completed by the end of the year. The five-compartment No. 2 shaft has been put down to 1,388 ft. M. A. Thomson is president.

★J. H. C. Waite, president of Quemont Mining Corporation, reported at the annual meeting in May that diamond drilling in the past 14 months has indicated more than 6,000,000 tons of ore averaging 0.181 oz. gold, and 1 oz. silver, 1.58 percent copper, and 3.2 percent zinc per ton. Though prospecting chances are good for the discovery of new orebodies, the tonnage now indicated is stated to be sufficient for a 2,000-ton plant. A large new shaft is to be put down west of the main orebody. Production is not planned before 1948. Jules R. Timmins, president of Hollinger, has been added to the board of directors.

★Elder Gold Mines has reached a depth of 400 ft. in shaft sinking and is preparing to open up a new vein which was found at a depth of 200 ft. Drill Hole 131 was put down from surface to test the new structure, and disclosed a width of 70 ft. averaging $3.47. This is correlated with ore cut in Hole 57, grading $5.78 across 27 ft. Average values of $8 were secured when this vein was found in cutting the station at the 200-ft. level. A. H. Honsberger is manager.

★East Sullivan Mines started shaft-sinking operations in May on a program estimated to cost $325,000. Pierre Beauchemin, president, reported that James and Buffam had been appointed consulting engineers and that L. T. Postle, formerly in charge at Chesterville Larder Lake, had been made manager. The five-compartment vertical shaft is being put down to 500 ft., opening three levels. Drilling is to test the orebody to a depth of 1,000 ft. Good copper-zinc recoveries have been indicated by metallurgical tests.

MANITOBA

★G. B. Tribble, in charge of operations for Squall Lake Gold Mines, Ltd., in a report for the year ended Dec. 31, 1945, presents a detailed picture of the exploration completed on the property, 5 miles north of Snow Lake. A total of 27,243 ft. of diamond drilling has been done in 241 holes. The major part of the drilling has been confined to shallow depths on the northwest arm of a syncline. Close drilling was done at irregular intervals over 9,500 ft. The

report details the assay values obtained in some 70 diamond-drill intersections and 12 surface samples. Lenses of mineralized basic sill have been located on five claims carrying values of approximately 0.20 oz. of gold over a width of 4 ft. In only one instance has the extent of the lens been delimited by drilling. The limited amount of deep drilling completed to date has shown a continuation of the arsenopyrite and gold mineralization.

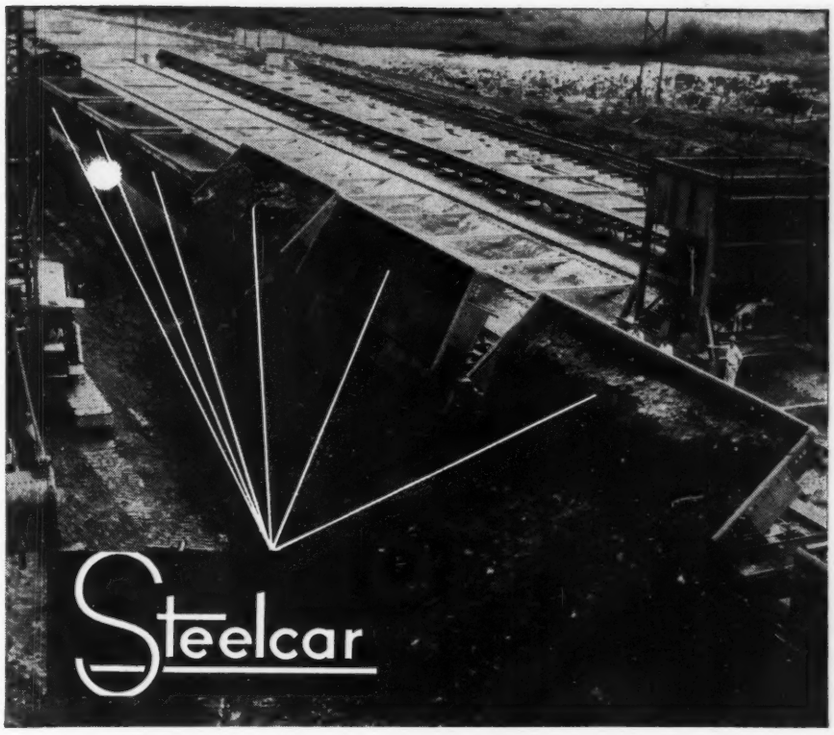
Recent drilling results released include two high-grade intersections in Hole 331: from 591.6 to 593 ft. returned 3.95 oz., and from 630.7 to 632.8 ft. returned 3.20 oz. Four other holes gave the following results: Hole 218, $2.88 over 3.5 ft.; Hole 219, $22.52 over 8.8 ft.; Hole 333, $8.08 over 9.5 ft.; and Hole 334, $3.85 over 8 ft.

★Due to an exceptionally early breakup, construction work on the 50-mile power line from Sherridon to the Howe Sound Exploration Co., Ltd., property at Snow Lake has been suspended. A diesel standby plant will now be installed much earlier than originally scheduled to eliminate any undue delay in completing plant installations and development operations. It is expected that the ultimate date of production will not be materially altered.

★Sherritt Gordon Mines, Ltd., have released additional diamond-drilling results obtained on the copper-nickel discovery at Lynn Lake. Holes Nos. 15, 16, 17, located at intervals of 50 ft. to the west of Hole 14, cut the following sections. Hole 15, 21.8 ft. to 286.2 ft. averaged 0.41 percent nickel and 0.51 percent copper; 293.7 ft. to 311.6 ft. averaged 1.20 percent nickel and 0.60 percent copper; Hole No. 16, 207 ft. to 228 ft. averaged 0.38 percent nickel and 0.47 percent copper; Hole 17 cut one 10-ft. section carrying 1.10 percent nickel; Hole 18, 50 ft. east of Hole 12, was apparently outside the mineralized zone. Holes 19, 20, and 24 are located 200 ft. north of Holes 12, 14, and 18. Hole 19 from 25 ft. to 367 ft. averaged 0.73 percent nickel and 0.47 percent copper. No. 20, 100 ft. east, averaged 1.0 percent nickel and 0.61 percent copper from 351 to 688 ft., with the last 145 ft. averaging 1.68 percent nickel and 0.93 percent copper. Hole 24, 50 ft. west of No. 19, averaged 0.78 percent nickel and 0.57 percent copper from 19.0 ft. to 283.3 ft. Hole 21, 200 ft. north of Hole 19, has not been completed. Hole 22, 100 ft. west, cut 22 ft. averaging 0.90 percent nickel and 0.60 percent copper. Hole 23, 200 ft. north and 100 ft. west of Hole 22, was drilled to a depth of 556 ft. with only low values in nickel and copper obtained. Hole 25, an additional 200 ft. north and 50 ft. west was apparently outside the mineralized zone.

Two new anomalies are reported to have been outlined a half mile to the north.

Sherritt Gordon Air Transport, Ltd., a wholly owned subsidiary of Sherritt Gordon Mines, Ltd., has been granted a commercial air license which permits



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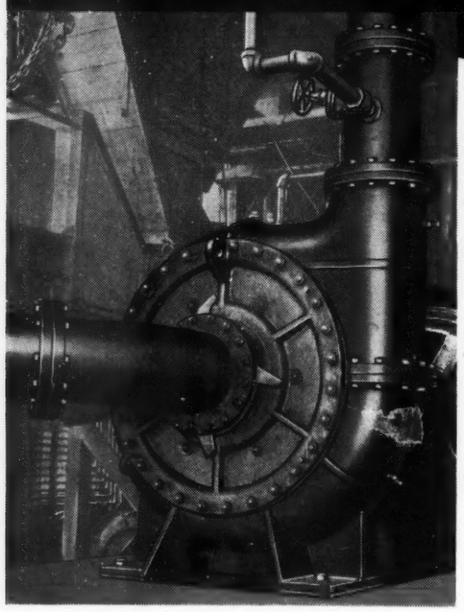

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● Handling low-grade amygdaloid deposits from a storage pool to a regrinding plant, this Morris 12", Type H dredging pump with a 14" suction and 12" discharge, operates 24 hours a day, pumping 4,583 gallons per minute against a 62-foot total dynamic head. Material pumped includes coarse rubbish along with particles of sizes ranging from 3/8" to flotation slimes. The pump, driven by a 200 HP motor, operates at 360 RPM, and has been in continuous 24-hour service since late in August of 1943.

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MORRIS CENTRIFUGAL PUMPS

Canada (*continued*)

air service exclusively for the purpose of the parent company.

★Goldbeam Mines, Ltd., has completed the new 500-ft. three-compartment shaft on the company's property near West Hawk Lake in the southeastern part of the province. Crosscutting has started on the 450-ft. level, and this will be followed by development on the 150- and 300-ft. levels. Hydroelectric power has now replaced that obtained from a diesel steam unit.

★Shaft sinking, long held in abeyance by lack of equipment, has commenced on the Ferro property of Wekusko Consolidated, Ltd., at Herb Lake. Former operators had reached a depth of 160 ft. It is planned to extend this to 550 ft. and establish levels at 275, 400, and 525 ft.

★Ken Bay Gold Mines, Ltd., is reported to have suspended drilling at Little Stull Lake, in northeastern Manitoba, because of disappointing results. Detailed surface exploration and geological mapping will be carried out to determine if further drilling is warranted.

BRITISH COLUMBIA

★As a result of recent changes in the cabinet of the Hon. John Hart, premier of British Columbia, the Hon. Herbert Anscomb, formerly Minister of Public Works and at one time Minister of Mines, has become Minister of Finance; the Hon. E. C. Carson, Minister of Mines for the past four years, has been appointed Minister of Public Works; and the Department of Mines and Trade and Industry has been divided into two departments: Mines and Municipal Affairs; and Trade and Industry. The new Minister of Mines and Municipal Affairs is the Hon. Roderick C. MacDonald, Progressive-Conservative member for Dewdney.

★The threat of a strike of mine workers, almost all of whom are members of the International Union of Mine, Mill and Smelter Workers, hangs over the metal-mining industry of British Columbia. The demands of the union in all cases, regardless of the wages obtaining in the locality, are for a raise of 29c. per hour for all employees, a 40-hour week, and "union security." More than 5,000 employees at Trail and Kimberley are involved in the negotiations between the union and the Consolidated Mining & Smelting Company of Canada, Ltd. The company answered the demands with a counter proposal, which was rejected by the men on a referendum vote. New proposals, not made public, have since been advanced and are now under consideration.

Bralorne Mines, Ltd., asked the union for the reasons behind the demands and, after obtaining a reply, has submitted a counter proposal. Meanwhile, a strike vote taken by the union

on May 6 is reported to have resulted in an overwhelming majority favoring strike action. Employees of Silbak Premier Mines, Ltd., leading Portland Canal gold producer, have voted strongly in favor of strike action after refusal of the company to meet union demands. Members of the Copper Mountain local of the union have voted in favor of weekly payments of $1 each to establish a strike fund in the event of a stoppage of work this summer.

Dr. Howard T. James, president of the Mining Association of British Columbia and managing director of Pioneer Gold Mines of B. C., Ltd., states:

"The demands of the union at this time are absurd. Many of the mines affected are actually operating at a loss and others are barely marginal. If the union is successful in enforcing its demands the effect will be to close more than half the operations in British Columbia."

★Frank H. MacPherson, general superintendent of Taku River Gold Mines, Ltd., left last week with a party of men for Tulsequah, where he will take charge of the preparation of the Polaris-Taku mine for a resumption of production. More than 75 men have now been sent to the mine, which is expected to reopen during the summer. Ore reserves have been estimated to exceed 300,000 tons, with the best faces on the bottom level. The mill, previously rated at 300 tons per day, will be enlarged this year to treat 400 tons daily, and next year it is planned to make a further increase to 500 tons.

★Stewart Canal Gold Mines, Ltd., has been incorporated to develop a group of 10 mineral claims on the Bear river, half a mile from the town of Stewart, Portland Canal mining division. The company is well financed with authorized capital of 3,000,000 shares of 50c. each par value, of which 1,526,490 shares remain in the treasury, after payment for properties and creation of present working capital. A strong sheared zone has been traced on the surface for 640 ft. and through an altitude interval of 250 ft. A drift-adit of 600 ft. length disclosed several bodies of commercial ore. A second drift is now being driven 125 ft. lower in the hope of blocking out a sizable body of ore. A sample shipment of 5 tons averaged 0.83 oz. gold, 2.0 oz. silver, and 3.5 percent copper per ton.

★Privateer Mine, Ltd., Zeballos gold producer, has taken an option on 28 mineral claims on Tranquil Creek, Alberni mining division. A strong shear has been traced for approximately 2,000 ft. at an average altitude of 1,700 ft. Development work by previous operators includes two tunnels —one at elevation of 2,000 ft. and the other at 1,800 ft. Privateer officials estimate the existence of 40,000 tons of ore between the two horizons.

★All buildings, plant, machinery, and equipment of Twin "J" Mines, Ltd., have been overhauled and prepared for

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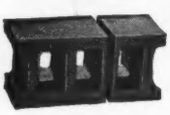
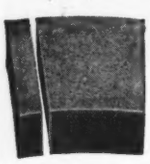


This concrete block, converted into a special size, was cut completely in two in 19 seconds.

One of the many intricate cuts performed on first quality clay brick for heat treating furnaces —made in 8 sec.



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Canada *(continued)*

a resumption of work in the near future. A detailed recheck of ore reserves between the No. 1 and No. 2 levels of the Tyee mine, the most readily available supply of mill-feed, is now being carried out. Timbering is being repaired where necessary to provide access to productive stopes, and diamond drilling has already started from underground stations. It is intended to make an exhaustive investigation of the Richard III holdings where the precious-metal content is indicated to be higher than elsewhere on the consolidated properties.

★Lasco Gold Mines, Ltd., announces the sinking of a shaft to a depth of 250 ft. on its Lasqueti Island property, Nanaimo mining division. Levels will be established at the bottom, the 125-ft. horizon, and at the horizon of the headframe. T. C. Botterill is general manager and B. W. W. McDougall, consulting engineer.

★During the fiscal year ended Dec. 31, 1945, Vananda Mining Co., Ltd., was advanced $84,874 by Pioneer Gold Mines of B. C., Ltd., for the equipping and development of the Little Billy mine, Texada Island. Development work, which was started late in the year, consisted of 212 ft. of sinking, 355 ft. of crosscutting, 20 ft. of drifting, and 634 ft. of diamond drilling. In the first quarter of 1946, further work amounted to 149 ft. of crosscutting, 201 ft. of drifting, and 3,456 ft. of diamond drilling. Four ore zones have been partly developed.

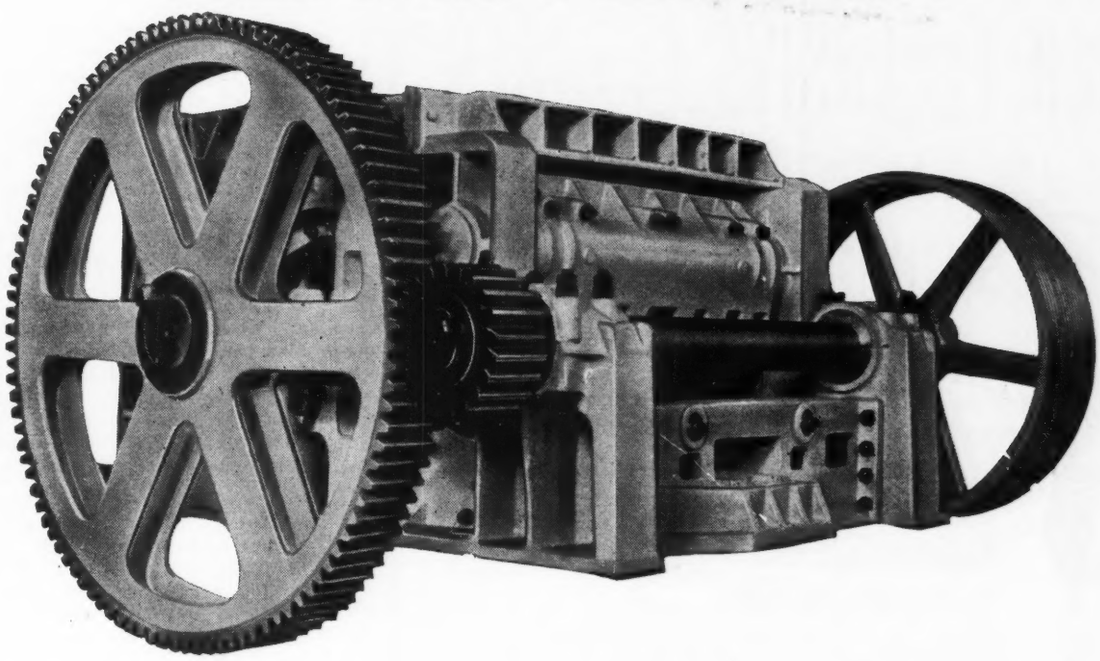
★During the first quarter of 1946, Bralorne Mines, Ltd., produced 16,005 oz. gold, valued at $616,193, from 29,274 tons, averaging 0.546 oz. gold per ton. Development of the "53" vein on the 16 level and of the "51" vein on the 11 level has been described by the management as encouraging.

★April production of Cariboo Gold Quartz Mining Co., Ltd., valued at $101,139, was the highest since July 1942, and included a ball-mill cleanup of 371 oz. gold. During the fiscal year ended Jan. 31, 1946, production was $13,303 oz. gold and 1,139 oz. silver, valued at $512,588, from 36,056 tons, averaging 0.387 oz. gold per ton. Other income was $2,873. Taxes and mint charges amounted to $6,505, production costs to $553,376, and administration expense to $37,714. After provision of $52,038 for depreciation, $36,047 for depletion, and $11,104 for employees' benefits, net loss for the year was $188,069. Exploration and development were confined mainly to stope raises, although toward the end of the year work was resumed on the 1,800-ft. level crosscut to the Pinkerton ore zone and on the 1,900-ft. level crosscut to search for the downward persistence of the replacement orebody discovered last year in 19-6c stope. Ore reserves at the year end were estimated at 322,500 tons, averaging 0.3818 oz. gold per ton. A resolution has been approved by shareholders whereby Noranda Mines, Ltd., and Quebec Gold Mining Corporation, Ltd., will purchase 100,000 shares each of treasury stock of the Cariboo company at $3.00 per share, thus adding $600,000 to the cash account. The money will be used for mine and plant expansion. All three companies are partners in the formation of a new company to be known as Williams Creek Gold Quartz Mining Co., Ltd., which will develop

(Continued on Page 152)

A FACE OF ORE on the 13th level of the Bralorne mine illustrates typical vein structure at this British Columbia gold producer, which mined 29,274 tons of ore averaging 0.54 oz. gold per ton in the first quarter of 1946. Photo by C. Cunnigham.

"PENNSYLVANIA"



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Canada *(continued)*

the Westport group of claims. Funds for the work will be advanced by Noranda and Quebec Gold.

★The net value of production of Highland-Bell, Ltd., Greenwood mining division, for the first quarter of 1946 exceeded $131,000 and was greater than the net value for the full year 1945. Control of Highland-Bell and of Sally Mines, Ltd., now rests with Leitch Gold Mines, Ltd., Ontario operator. A crosscut will be driven approximately 700 ft. from the main adit to a point 125 ft. below the lowermost workings in the old Bell mine, and an examination will be made of the Sally and other adjoining properties with a view to initiating a development program. Shareholders have authorized an increase in capital from 1,500,000 to 2,000,000 shares. Ore shipped during 1945 totaled 1,334 tons, yielding 255,189 oz. silver, 70,996 lb. lead, and 63 oz. gold.

★After providing for income, excess profits, and mineral taxes, depreciation of plants and investments in subsidiary mining companies, net profit of Consolidated Mining & Smelting Company of Canada, Ltd., for the year 1945 was $11,517,758, equivalent to $3.52 per share, compared with $2.99 per share in 1944. Dividends involved payment of $8,189,653. Despite the shortage of labor, the rate of operation at the Sullivan mine was increased to 2,435,877 tons of ore mined. About one million yards of backfill, sufficient to replace 3,650,000 tons of ore, was placed. Exploration and development were successful in creating a net increase of about 1½ million tons in ore reserves. Sinking on the 3,360- shaft (No. 1) below the 3,350-level was started and will be continued through 1946. Mill performance was notable for the increase in operating capacity to 8,457 tons daily. At Trail, the tonnage of refined lead was increased to 163,142 in 1945 from 143,873 in 1944, and bar zinc output was 134,873 tons, compared to 117,365 tons in 1944. Silver production remained practically unchanged. The output of chemicals and fertilizers continued to increase above all previous records. Development work was continued at the Con mine, at Yellowknife, N.W.T. Other gold mines owned, or in which the company has a substantial interest, were idle throughout the year except for a small operation in Nova Scotia. The Pinchi Lake mercury property remained closed.

★Bayonne Consolidated Mines, Ltd., Nelson district, has resumed milling after a suspension of three years. Favorable ore development both above and below the main haulage level has created a substantial reserve of mill feed.

YUKON

★Whitehorse is a scene of activity this season. At least 200 individual miners

are going out to try their luck, together with representatives of numerous mining companies. Burwash Placer Mining Co., made up of Whitehorse men, will spend $50,000 in development work on Burwash Creek.

★Hudson Bay Mining & Smelting Co. hauled 14 tons of supplies to Log Jam Creek by dog team this spring. Johnny Hogan and a crew of men were flown to Thistle Creek to start dredge installation work. Cyr Creek Placer Co., backed by Vancouver interests, will develop its property. George Murray is operating placers on Bates Creek, in the Alsek district. He, with J. McDougall as manager, will work on Iron Creek, 80 miles from Whitehorse. Barker and Ray are on Shorty Creek in the same area.

★About 280 claims are staked in the New Victoria Creek district. Dr. W. V. Smitheringale, acting for Toronto interests, has added 11 claims to 19 others in this district, and is supervising the erection of a camp. Samples are said to have assayed as high as $750 to the ton.

★Yukon Gold Corporation's production in 1945 exceeded $900,000, almost a 50 percent gain over 1944. W. M. S. McFarland, general manager, expects that 1946 production will exceed one and a half million dollars. The company plans to achieve capacity in placer operations before working its gold property in the Dawson district.

★Shareholders of Reno Gold Mines, Ltd., a B. C. incorporation, have authorized the purchase of 4 1/3 miles of placer ground on Canadian Creek, Dawson district. Payment is 530,000 shares and $100,000 cash out of first production. Dredgeable reserves have been estimated by O. C. Thompson, managing director, at 1,557,000 cu. yd.

MEXICO

Miners demand 40 percent wage rise—Major producers ask help of President with tax problems

★Coincident with the ending of its convention in Mexico City, the miner's union presented demands that nonsilver mining companies revise existing labor contracts and raise wages 40 percent. Carbonifera de Nueva Rosita, Coahuila coal producer, yielded at once with a raise of 90 centavos daily and other benefits that will increase its annual working cost by about 3,000,000 pesos. Cerro de Mercado, iron mine near Durango City, raised wages 60 centavos and now faces a yearly increase of about 1,000,000 pesos in costs. Similar contract revisions are under discussion with Monterrey Iron & Steel Works, in Nuevo Leon.

Representatives of major Mexican mining companies talked with President Avila Camacho in May in an ef-

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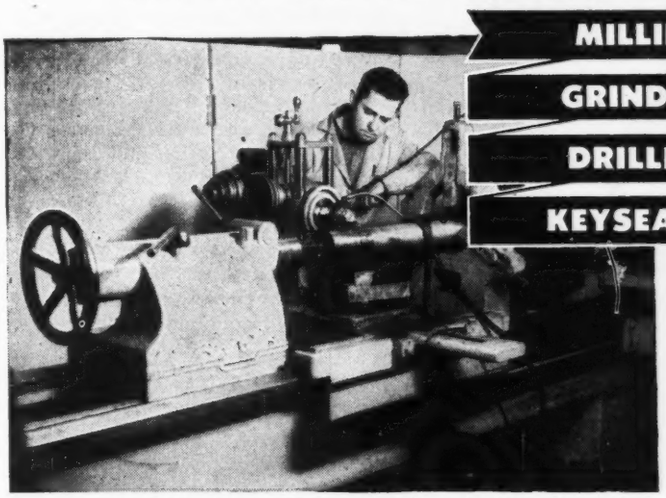
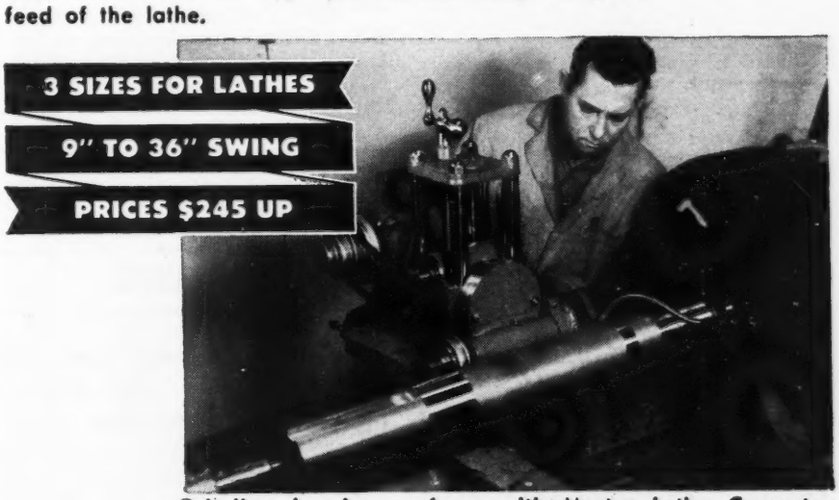


The Master Lathe Converter mounted on tool post carriage of a 27" lathe milling a keyway on a 4½" diameter shaft at the rate of 1½" per minute, using the power feed of the lathe.



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Mexico *(continued)*

fort to present the effect on Mexican mining of recent economic events. Contending that current increases in metal prices are transitory, the group asked for stabilization of taxes on the more than 200 mining companies operating in Mexico, which employ about 65,000 persons. The President was reported to have given assurances of his willingness to aid legislation favorable to development of the mining industry.

Peñoles has advised the Federal Board of Conciliation and Arbitration that all of its plants at Monterrey, except the refinery, have had to close because operations have been unprofitable since the recent strike against Mexican silver producers. The company offered to indemnify about 200 dismissed workers by payment of a sum reported as over 1,000,000 pesos.

★The Sierra Pinto mine, in northern Sonora, a gold property operated by A. L. Richards of Ajo, Ariz., is again shipping ore to the El Paso smelter, although shipments are sporadic as yet because of labor difficulties.

★At a recent emergency meeting of the cooperative that for 10 years has worked the former Dos Estrellas property, at El Oro, State of Mexico, directors of the group called for a 15 percent wage cut and warned members that they must work harder, inasmuch as falling production now barely covers operating expenses. The monthly payroll of the society is about 400,000 pesos.

★The Second District Court of Mexico City has ruled that the Federal Board of Conciliation and Arbitration exceeded its authority in expropriating part of American Smelting's plant at Avalos, Chih., as a public utility. An injunction against the expropriation was granted the company.

BRAZIL

Volta Redonda steel plant nears production—New steel plant is planned for Itabira region

★Volta Redonda, Brazil's largest fully integrated steel plant, has moved two steps further toward full operation. The first batch of coke was produced on April 26, and the thousand-ton-per-day blast furnace was to be blown in within four weeks of that time. Pig iron output will be converted in four 165-ton open-hearth furnaces, and it is expected that the rolling mills will be in full operation by October. When complete, the plant will have a capacity of 300,000 tons a year, doubling the present steel capacity of Brazil, and will supply the domestic requirements for heavy structurals, rails, plates, sheet, tin-plate, strip, and forged railroad wheels and tires. The coke plant, which has a capacity of 1,200 tons of coke per day, was designed by the Koppers Co., of Pittsburgh, Pa. The original feed for the ovens was run-of-mine high-ash coal from the Santa Catarina mines, in southern Brazil, washed near the mines in a modern washing plant with a capacity of 400 tons per hour. In the future, a mixture of 80 percent Santa Catarina coal and 20 percent low-ash American coal is planned, to reduce the ash content of the coke. The Volta Redonda plant, operated by the Companhia Siderurgica Nacional, will be the first steel operation in Brazil to use coke. All the existing 29 blast furnaces use charcoal, and their production of about 320,000 tons per year is probably a larger charcoal pig-iron output than that of any other country. Paulo C. Martins is manager of the plant, Col. Macedo Soares e Silva having been appointed Minister of Public Works in the new Brazilian cabinet.

★Another new steel operation is the mill to be erected in Minas Gerais, close to the Itabira iron ore deposits. The new plant, with an annual capacity of 54,000 tons, is in Coronel Fabriciano, on the Vitoria-Minas railway approximately 280 miles inland from the port of Vitoria. It will turn out steel in special shapes and analyses.

★In spite of the drop in prices for wolframite concentrates, production continues steady at the Inhandjara mill, near Jundisi, Sao Paulo. No letup in production is contemplated, and reserves are large. The rather complex ore comprises cassiterite, sulphides, and topaz. Most of the production from the mill is shipped to the United States. Oswaldo de Salles Sampaio, a pioneer in the development of the lead-silver belt of the Iguape River Valley, is president of the Sociedada Mineracao Inhandjara Ltda., operators of the mill.

★After being idle for three years, the Apiai smelter has been turned back to the government of the State of Sao Paulo, and plans are being made to place it again in operation. The Apiai smelter was the first lead smelter and refinery built in Brazil, constructed by the government in 1939 to stimulate development of lead and silver mines in the Iguape River valley. It was operated steadily until October, 1942, although at a low rate of production due to the small shipments of ore received for processing.

★Production of lead has begun at a new refining plant recently completed near the Panelas mines, in the State of Parana. Raw ores from two parallel veins are being smelted. The smelter comprises a six-compartment sintering furnace and a Mace blast furnace, following the pattern of the Apiai smelter. The refinery has a reverberatory softening furnace; kettles for decopperizing, desilverizing, and dezincing; and conventional retorting and cupelling furnaces. Sao Paulo offers a good local market for the refined lead, absorbing about 20,000 tons per year.

★Diamond deposits claimed to be the

richest ever discovered in Brazil have been found in the hinterland of Western Brazil, near the River Paranahyba. According to a member of the Diamond Mine Union, several weeks of exploitation of the site have yielded diamonds worth $500,000. The same area accounted for a considerable output of industrial diamonds during the course of the war.

★The second annual meeting of the Associacao Brasileira de Metais was held in Rio de Janeiro May 14 to 23. Prof. F. J. Kafuri, of the Escola Nacional de Engenharia of the University of Brazil, delivered the annual lecture, and Prof. Arthur Phillips, of Yale University, spoke on "Problems and the Outlook of Metallurgy in Brazil." The officers of the association are Miguel Siegel, consulting engineer of Sao Paulo, president; Col. Macedo Soares e Silva, former manager of the Volta Redonda steel plant and now Minister of Public Works, vice president; and Tharcisio D. de Souza Santos, professor of non-ferrous metallurgy at the Escola Politecnica of the University of Sao Paulo, secretary.

PERU

Non-metallic mineral output is increased—New gold mill for Capitana mine, near Chala

★Production at the Quiruvilca mines of the Northern Peru Mining & Smelting Co. has been stepped up to 300 tons a day. Ore values, contained primarily in enargite, continue to average about 5 percent copper. These mines, which are about 100 miles inland from Trujillo, have been worked steadily since 1922. Ore is transported to the flotation plant at Shorey by means of an aerial tram, said to be the longest in South America, which has a total length of 40 miles between the terminals at Callacuyan and Samne. This same tram also transports ore from the Milluachaqui silver mines to the concentrator at Samne.

★A 100-ton cyanidation plant is in process of installation at the Capitana gold mine. This mine, formerly known as the Tocota mine and belonging to the Rosenshine group, is near Chala, about 400 miles south of Lima. It has been under development for the past five years, and reserves are estimated at 60,000 tons of 0.6 oz. gold ore.

Machinery for the new plant was formerly used at the Saramarca and Santa Rosa gold mines.

★Non-metallic mineral development in Peru is taking great strides. Some current projects under way include a new cement plant under construction in Arequipa and another proposed for the vicinity of Lima. Gypsum deposits throughout the country are undergoing extensive exploitation; barite, kaolin, magnesium sulphate, and ochers have assumed considerable importance with

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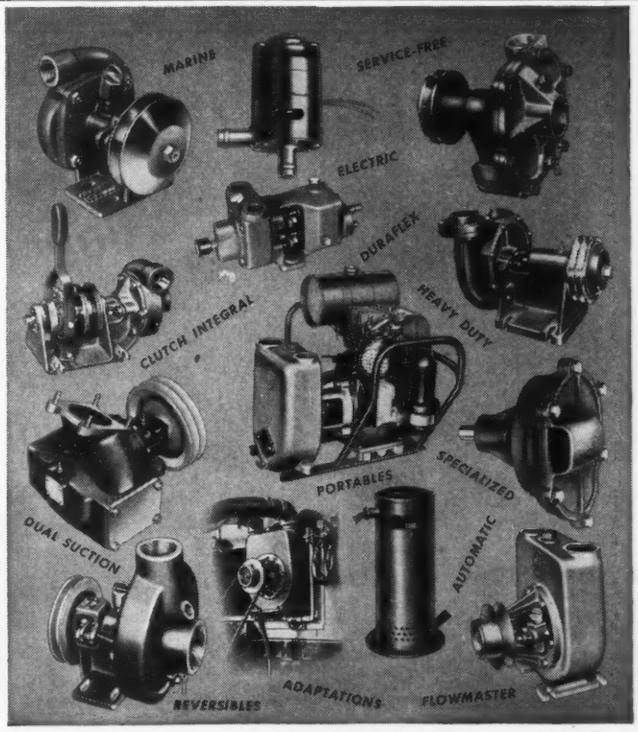

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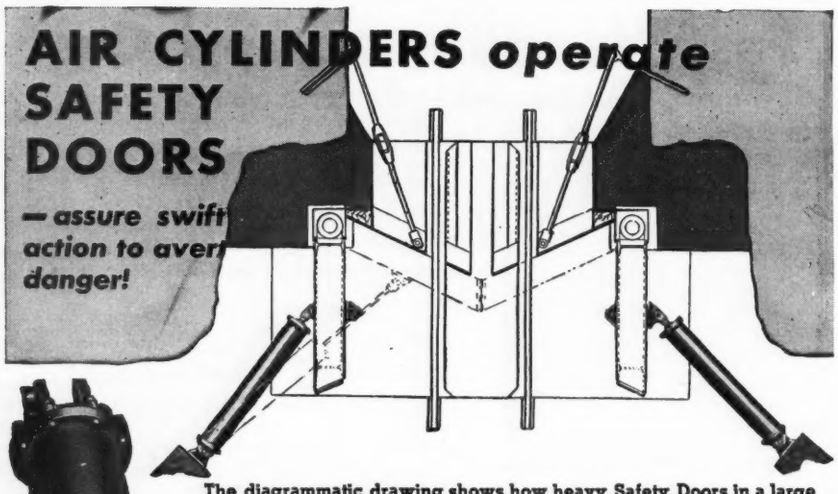

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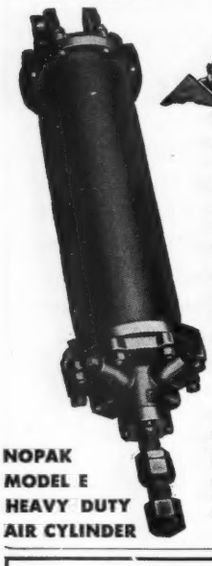

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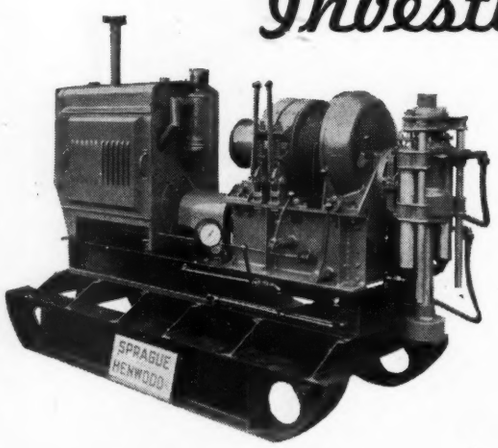

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Peru *(Continued)*

the growth of Peruvian glass, porcelain, and paint industries. Ochers and magnesium sulphate are being produced in the Santa River region, 60 miles inland from the port of Chimbote, where Nicholas Garatea, who owns the deposits, has set up a small extraction plant.

Potentially the most important nonmetallics in Peru are the ornamental stones. Several companies are quarrying marble, granite, onyx, and travertine. One of the largest companies is Marmoles y Granitos, S. A., which has expanded considerably during the last few years and is now mechanizing its quarries for large-scale production and exporting of onyx, marble, and travertine to the United States and several South American countries. The travertine deposits are between La Oroya and Huancayo, in central Peru, and extend for several miles along the Mantaro River valley in the midst of Mesozoic limestones. Peruvian travertine compares favorably with Roman travertine, according to U. S. Standards, and has been extensively used in Peru in such buildings as the new American Embassy, the Lima City Hall, and numerous residences, as well as for public monuments. There are two kinds of travertine in the Mantaro valley: one a light, creamy stone comparable to the Italian variety, the other a darker stone with a golden hue, which has a higher market value.

★An extensive survey of Peruvian mining has been undertaken by the Banco Minero del Peru which will soon be published. The study will contain geological maps, figures on production, an appraisal of all the important mining properties, and estimates of the possibilities for development of new mining regions.

PHILIPPINES

Lepanto rehabilitation work in progress—New mill for Balatoc—Japs sought copper on Panay

★Lepanto Consolidated, formerly the major copper producer of the Philippines, has 100 men engaged in rehabilitation work. During the occupation the Japanese worked the mine intensively, increasing the size of the mill from 400 to 1,200 tons per day, but they destroyed the mill when they retreated. Such machinery as can be salvaged belongs to other mining companies in the Baguio field, from which it has been taken by the Japanese. The power plant was bombed and two of the 13 diesels were demolished. Five diesels, taken from the Baltoc power plant, are being returned to that property.

It is reported that the Japanese employed 4,860 men at the mine, and 200 engineers on the staff. This was four times as many men as were at work in

the mine before the war. It appears that the invaders were mining 800 tons a day of ore running 2.42 percent copper and 0.09 oz. gold per ton, which suggests either very poor mining or a desperate need for copper, as the average ore content is much higher. The main haulage level is now cleaned up to within 600 ft. of the face, or a distance of 2,760 ft. from the portal. Chutes and raises have been repaired. It is reported that reserves are 361,000 tons of ore running 6.9 percent copper and 0.16 oz. gold per ton. The company's estimate before the war was approximately 500,000 tons of 6 percent copper. Hence it would appear that the Japanese must have done considerable development work in addition to mining. When the Japanese retreated from the property they left about 8,000 tons of concentrates at the mine and in San Fernando, the shipping point. Bank loans on this ore as collateral have enabled the company to obtain working capital.

★Suyoc Consolidated, one of the principal gold producers of the Marsman company, operating about 50 km. south of Lepanto, is completely dismantled. The Japanese evidently transferred all surface equipment to Lepanto, even the new shaft hoist. The mine is flooded 90 ft. below the shaft collar.

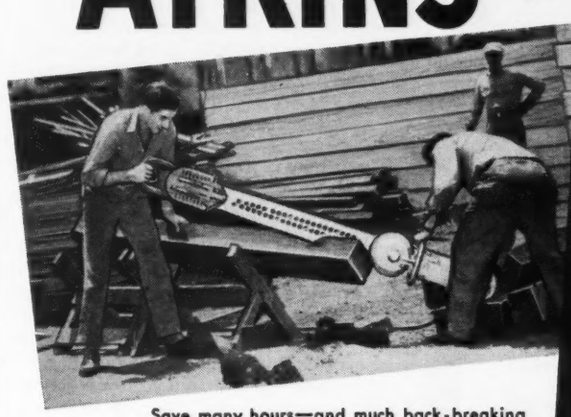
★At the Balatoc Mining Co's property, active rehabilitation is proceeding in the mine, mill, and power plant. More than 40,000 ft. of tunnel has been cleaned up. Foundations for the new mill have been excavated on the same elevation as the main haulage tunnel about 1,700 ft. northeast of the old mill site. The new mill will be erected between the Keystone workings of the Benguet Consolidated and Balatoc. A 1,700-ft. tunnel from Balatoc will be required to reach the mill, of which 600 ft. has already been driven. The mill will be situated 7,000 ft. from the 4th level of the Keystone vein. Ore from the Antomok workings of Benguet will be trammed underground to the Keystone shaft, hoisted to the 4th level, and trammed on the new haulage level to the central Benguet-Balatoc mill. It is reported that the new mill unit will be of 1,000 tons capacity, and additions will be made as conditions permit.

★Work at Benguet Consolidated is limited to cleaning up the Keystone shaft and the Keystone vein workings. The new haulage level to the central mill, referred to in connection with Balatoc, has been started as well as cleaning out the drainage level for the main mine.

★The Demonstration Mining Co.'s workings are entirely caved. A number of men are employed in salvaging machinery from the mill.

★According to a recent report to stockholders of Big Wedge Mining Co., the company suffered a considerable loss from highgrading during the occupation years. It is asserted that at one time more men were engaged in this than were ever employed previously at

ATKINS *Chain Saw*



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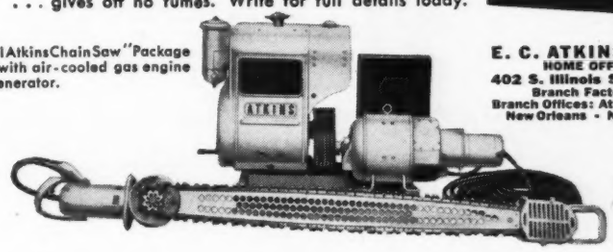

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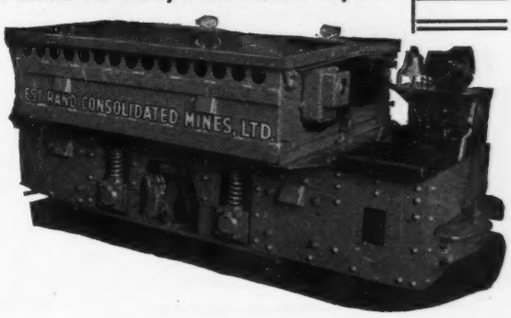
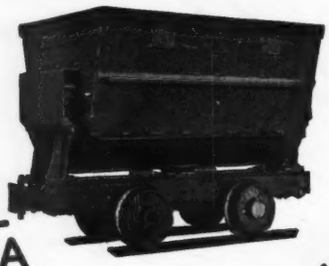


AN ACE IN THE HOLE



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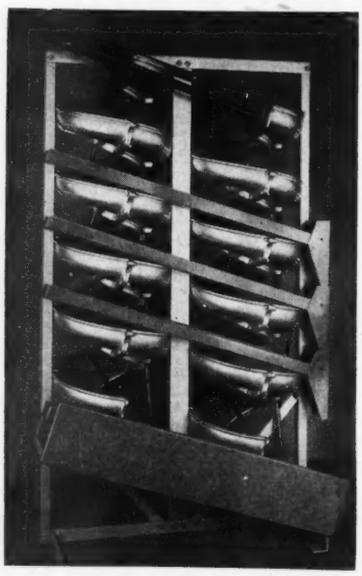

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Philippines (*Continued*)

the mine. It does not appear that the Japanese did more than to attempt unsuccessfully to work the Broadway vein with the hope of utilizing the copper content of the ore. The company is at present engaged in repairing and cleaning up the main haulage tunnel. Although the Japanese left this property in unusually good condition, many essential parts of the engines were stolen.

★Prior to the war the San Remigio copper mine, in the extreme southwestern part of the island of Panay, was operated as a open pit, from which about 20,000 tons of 5 percent copper ore was mined and sent to Japan. During the occupation, the property was operated by Ishihara Kogyo Kaisha, and more than 40,000 tons of 3 percent ore was developed. Early in 1942 the same company began exploring the whole belt of copper mineralization that runs through the claims of San Remigio and the adjoining property of Real Copper and Antique Consolidated. A good 10-km. road was built to bring ore to the wharf at San Jose. Center of operations was at Bungkungan, where a power house, hospital, and staff houses were built.

★The Antique Consolidated deposit was also developed by the Japanese, although the ore runs only about 1.6 percent copper. Open cuts and small tunnels along the 1,500-ft. belt of mineralization have developed about 25,000 tons of probable ore, but the camp and roads built by the Japanese are in utter disrepair.

★In northeastern Panay, the Japanese did considerable work on the Pari group of claims belonging to the Pilar Copper Co. A large camp was built, including a power house and a hospital, but guerrillas burned the buildings after the Japanese left. Exploration during the occupation uncovered ore of about 2.6 percent grade, carrying copper as carbonates and sulphides, apparently of secondary character.

AUSTRALIA

Wiluna's tailings only real "ore" reserve at present—New gold-dredging field in Victoria

WESTERN AUSTRALIA

Wiluna Gold Mines, Ltd., has begun the re-treatment of accumulated calcined residues. The milling process has been fine-grinding, flotation, and roasting and cyanidation of the flotation concentrate. Due, probably, to the formation of an arsenate or antimonate coating, cyanide plant residues have always been high in gold. A 50-ton plant re-treatment of 400,000 tons of calcine assaying 0.30 oz. gold per ton. The process includes a chloridizing roast to make the gold amenable to cyanidation. Recoveries are stated to be between 66 and 80 percent. The underground position continues to deteriorate, and it will not be long before operations will be confined to dump retreatment. Mill tonnage has now decreased to 10,000 tons of ore of a higher grade than normal, which will show a small profit and also provide sulphur for the retreatment process.

In the later war years the mine has been assisted by subsidies given by the Commonwealth and State governments to insure a supply of arsenic and antimony for war purposes, the financial assistance provided amounting to about $395,000. The future of the company depends on the acquisition of a new mine which can be worked on a large scale. An option, in which the Wiluna company holds 75 percent, and Gold Fields Australian Development Co., Ltd., holds 25 percent, has been taken over the Mount Charlotte mine, at Kalgoorlie. Diamond drilling by the vendor company indicated more than 1,000,000 tons of ore with a value of 0.275 oz. gold per ton. As soon as men and supplies are available, development will begin, and if operations are successful the plant will be transferred from the Wiluna mines to Mount Charlotte. The company also has a one-third interest in the Porphyry mine, a lowgrade, open-cut operation 80 miles north of Kalgoorlie. Two other properties are being examined in conjunction with Gold Fields Australian Development Co., Ltd.

The State gold production has shown an increase during the months of January and February over production for the same months of 1945 and 1944. For January, 1946, output of gold was 42,140 oz., compared with 41,491 oz. in that month of 1945, and 36,708 oz. in 1944. February recorded 37,271 oz., compared with 35,867 and 33,176 oz. in the two preceding Februaries. Production for the year 1945 was 463,521 oz. and for 1944, 464,440 oz. Preparations are being made by a number of mines closed during the war, for resumption of operations, but manpower is insufficient and essential stores are in short supply. Expansion of operations on the Kalgoorlie field is being hindered by the problem of fuel for the mines. Power is generated from wood fuel, but reserves are becoming depleted to such an extent that normal operations may become impossible. Norseman Gold Mines, N. L., in the year ended Oct. 31, 1945, treated 41,526 tons of ore of an average assay value of 0.146 oz. gold per ton. Development was restricted to a total of 2,412 ft., including diamond drilling. It is recognized that the rate of development must be increased to overtake the position caused by restrictions during the war years. The company is working the Mararoa reef, which is also the principal orebody in the mine of Central Norseman Gold Corporation to the north. It has been proved that the upper zone, in which ore averaged 0.35 oz. per ton, extended to the No. 8 level, below which a low-grade zone continued down the dip for

about 400 ft. Below this low-grade zone, operations on the northern end of the reef have shown the ore to be again payable. It is therefore the intention of Norseman Gold Mines, N. L., to carry exploration and the development into this zone. Ore reserves were estimated at 170,000 tons with an average assay value of 0.19 oz. gold per ton. The following were working costs for 1945 on the Mararoa reef: Ore extraction, 24s. 10d.; ore treatment, 11s. 11d.; total, 36s. 9d. per ton.

VICTORIA

★A new gold-dredging area has been proved on the Loddon River, at Newstead, near the leases which have been worked for years by Victoria Gold Dredging, N. L., with considerable success. The new area, on Jim Crow Creek, has been tested by Gold Mines of Australia, Ltd., most of the boring having been done before the war. At that time plans to equip the property had to be abandoned, but the tests showed 10,500,000 cu.yd. of alluvium with an average gold content of 2.5 gr. of gold per cubic yard. The wash is free, and general working conditions are similar to those on the property of Victoria Gold Dredging. On that company's leases the ground is 25 ft. deep, free from large stones, and is generally free-digging, containing very little clay. The bottom is soft and regular. It is expected that on the Jim Crow Creek area the recovery by dredging will be 84 percent of the bore values, equivalent to 2.1 gr. per cubic yard. It is proposed to equip the leases with an electrically operated dredge having an annual capacity of 1,750,000 cu.yd. and provided with resoiling equipment similar to that on the neighboring Victoria Gold Dredging Co.'s dredge. Resoiling is compulsory on all dredging undertakings in the State.

SOUTH AUSTRALIA

★Zinc Corporation, Ltd., one of the four large Broken Hill mining companies, intends to spend from $250,000 to $300,000 in prospecting for natural gas in the country in the neighborhood of Lake Frome, a large, dry salt lake, lying to the east of Broken Hill, between the Barrier and the Flinders ranges. If the work planned is successful in proving adequate volumes of gas, the intention is to pipe the gas to Broken Hill for use as fuel in the Central Power House, which is at present operated with oil fuel.

NEW SOUTH WALES

★Developments in the mine of North Broken Hill, Ltd., at the northern end of Broken Hill line of lode, continue to be satisfactory. A recent report states that horizontal diamond drilling from the exploratory winze at the 2,920-ft. level has disclosed 79 ft. of ore of average grade in lead, zinc, and silver, followed by three narrower sections of lode, which is a normal feature in the vicinity of the extremities of the southern orebody. Exploratory work northward at the 2,600-ft. horizon has

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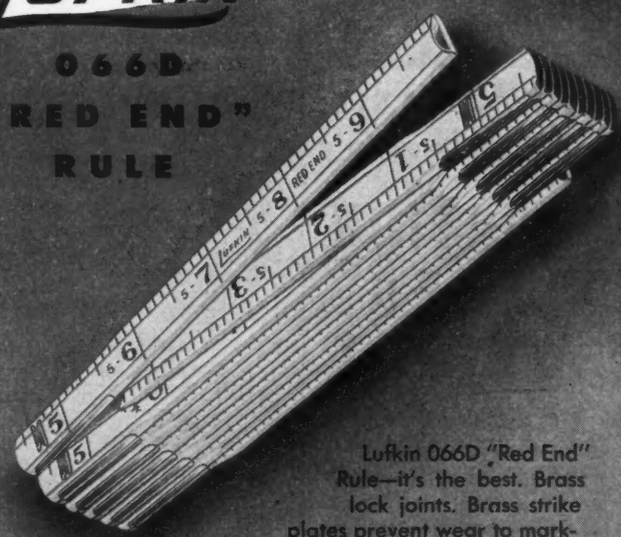

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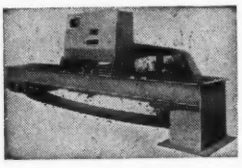

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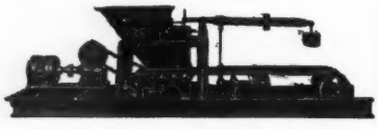

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Australia *(continued)*

reached the De Bavay fault, but information is not yet available as to conditions on the northern side of the fault. This structural feature is expected to have an important influence on the northern orebody.

AFRICA

O.F.S. borehole cited as freak—Draw plans for research group to study deep mining methods

★Warnings from responsible sources continued to be made during last month against overemphasizing the import of the rich Geduld gold strike near Odendaalsrust, in the Orange Free State. Sir Ernest Oppenheimer, chairman of the Anglo-American Corporation, declared: "We are naturally not justified in attaching too much importance to any one borehole result, and in this case the astounding value encountered must be looked upon as in the nature of a freak. . . ." However, he cited nine to eleven large mines which have been proved or indicated by drilling on a line running roughly north and south through the town of Odendaalrust. It seemed likely that some of these mines would be unusually rich. Altogether, from the beginning of drilling operations in the Free State until the end of 1945, 54 boreholes have been completed, and 12 are in progress. Of the completed boreholes, 30 made Basal Reef intersections, of which 15 were payable, averaging 26.8 dwt. over 17.1 in., or 458 inch/dwt.

★Figures on Tanganyika's exports of three important minerals during 1945 have recently been published by the Department of Lands and Mines. Gold exports totaled $1,760,000; diamonds, $2,500,000; and mica, $360,000. The peak year for gold in Tanganyika was 1940, with exports of $4,840,000. Production during the war was seriously affected by shortage of labor, which was diverted to higher war priorities such as sisal.

★The South African parliament is now considering a silicosis bill which goes considerably beyond the provisions of existing law. Not only does it cover all diseases of the lungs caused by inhalation of mineral dust, but it provides for the classification of "registered" mines as well as the present "scheduled" mines. In other words, it acknowledges the presence of mines and industries outside the main producing gold mines on the Witwatersrand, in which conditions conducive to silicosis may exist. Extension of benefits under the new bill would cost some $32,000,000, over and above the industry's present liability of $56,000,000. There is common agreement that this is not an exorbitant sum to recompense phthisis sufferers, even though modern methods of dust prevention and improved ventilation have done much to reduce the disease's incidence on the Rand. However, it represents a heavy new burden on the industry—(an action diametrically opposed to the policy accepted by the Minister of Finance in framing his newest goldmine taxation proposals), and objections are likely to be raised on this basis during debate on the bill.

★The Transvaal's March gold output of 877,449 oz. is the lowest return since February 1935, and considerably below the February 1946 output of 946,577 oz., despite the longer month. Reason for the drop is the strike of underground workmen during the month, directed not against the employing companies but against their own union. As a result of the strike and of a rise of working costs for the month from $25 to $28.20 per ounce, March profits fell to $5,600,000 for the Rand producers. On a per-ton-milled basis, this is the lowest figure since the gold standard break in 1932. No fewer than 12 of the 45 listed producers reported losses for the month, ranging from $920 for New Modderfontein to $106,000 for Langlaagte Estate.

Operating Returns for 1945, Various Rand Mines

Mine	Tons Milled	Revenue $ per Ton	Costs $ per Ton	Working Profit $ per Ton
Central Mining—Rand Mines Group				
City Deep	1,093,000	8.32	6.22	2.10
Crown Mines	3,327,000	7.62	5.26	2.36
East Rand Pty.	2,407,000	6.90	5.12	1.78
Rose Deep	868,000	5.15	4.64	0.51
Geldenhuis Deep	802,500	4.01	3.69	0.32
Durban-Roodepoort	2,003,000	6.40	4.72	1.68
Modderfontein B.	96,000	5.74	4.01	1.53
New Consolidated Gold Fields Group				
Rietfontein Con.	323,000	7.15	4.63	2.52
Vlakfontein	263,000	14.58	10.13	4.45
Nigel	486,300	9.59	6.95	2.64
Union Corporation Group				
East Geduld	1,849,500	9.95	3.41	6.54
Geduld Pty.	1,227,000	7.51	4.57	2.94
Grootvlei Pty	1,915,000	9.01	3.98	5.03
Marievale Con.	626,500	9.99	6.78	3.21
Van Dyk Con.	1,188,500	6.95	5.70	1.25
Anglo-American Group				
Brakpan Mines	1,247,000	6.95	5.69	1.26
Daggafontein Mines		9.62	3.85	5.77
East Daggafontein	1,098,500	8.74	4.81	3.93
S. A. Land & Exp.	1,091,500	7.65	4.57	3.08
Springs Mines	1,487,000	6.62	5.21	1.41
Western Reefs	959,500	8.55	5.14	3.41
Western Springs	728,500	7.48	5.87	1.61

Reserve estimates for most of these mines were given in E.&M.J. for April, 1946, p. 148.

★Rhodesia Broken Hill Development Co. announces full operation of the new Lunsemfwa hydroelectric plant. Part of the new lead concentrator has been completed, and the new lead smelter is producing at a rate of 800 to 1,000 tons of pig lead per month. All new facilities, including a new zinc roaster, are expected to be in service in July.

★Current high demand for diamonds has caused the De Beers company to reopen its long-closed Premier diamond mine.

★A new minerals ordinance in Nigeria requires, among other things, that each mining right or lease must carry a covenant agreeing to restore mined areas as soon as possible to a condition fit for agricultural use.

★A Deep Level Mining Research Institute was recommended recently by a Government-appointed commission to study the problems posed by increased mining depths on the Rand. Embodied in a bill now (May 1946) before the legislature, the Institute would promote and conduct research leading to improved methods of mining below 8,000 ft. from both cost and safety standpoints. Financed by company contributions, the Institute would release its findings on a fee or royalty basis.

RUSSIA

Copper smelter planned near Lake Balkash—Mining development is pushed in Azerbaidzahn

★According to reports in the Soviet press, resumption or expansion of ferrous and non-ferrous metal mining and smelting industries is proceeding rapidly throughout the Soviet Union. The Severonickel combine on the Kola peninsula is being restored, as is the Volkov aluminum plant near Leningrad. A new mine and mill of the Tekeli lead-zinc combine in southern Kazakhstan is reported completed. The new electrolytic section of the aluminum plan at Bogoslovsk, in the northern Urals, is in operation. The greatest activity in iron and steel production has taken place at Magnitogorsk, where several new concentrating plants and furnaces have been built. Capacity is also being increased at iron and steel plants at Mariupol and at Chelyabinsk. Pipe mills were being built or expanded in the Ukraine, and new coke batteries were under construction at various places. No figures on production have been given in any of these operations.

★A new copper-mining and smelting center is reported under development in Dzhezkazgan in the region of Lake Balkash. Both open-pit and underground mines are said to be operating, and a smelting center is under construction, which will give employment in various lines to a town of 16,000 people. Capacity is unstated.

(*Continued on page* 162)

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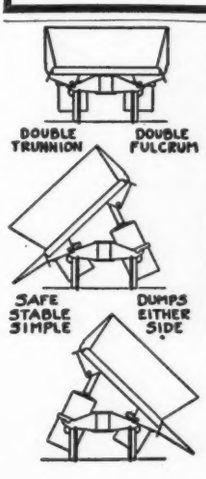

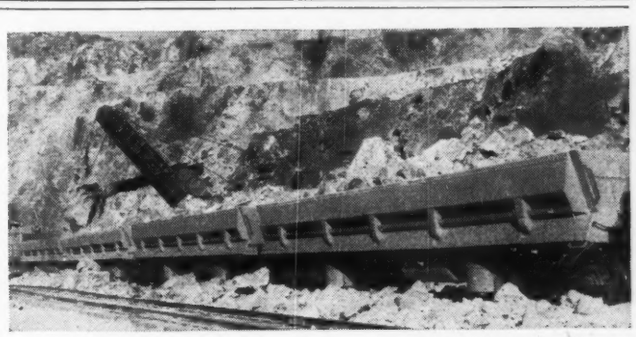

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Russia *(continued)*

★Deposits of magnetite, alunite, barite, and cobalt are reported being developed in the Azerbaidzhan Republic. The magnetite is found along the Kashkarachai River valley near the Armenian border. Millions of tons of high-grade ore are said to have been located. Pig iron produced at Tbilisi will be used in a pipe-rolling plant at Sungait. Alunite in Upper Dashkesan will be used as raw material for the Azerbaidzhan aluminum combine and in Armenian aluminum plants. Barite from the same area will be used in drilling oil wells in Baku.

★Zirconium production from deposits near Mariupol, in the Ukraine, will be stepped up this year by introduction of machinery to replace primitive placer mining methods used heretofore, and by construction of a refinery near the mines. Zirconium is used extensively in Soviet industry in manufacture of enamelware, tube and bulb filaments, cutting tools, and other articles.

SWEDEN

Boliden maintains production under wartime difficulties

★Boliden Mining Co., in common with Swedish industry generally, is facing problems of fuel and electric power supply in maintaining its production of gold, silver, copper, nickel, and lead. Because of severe shortage of coke, the company's sulphur mine is shut down.

Recently released Boliden production figures for the war period are given on the accompanying table.

For the period 1938 to 1944 inclusive, annual consumption of coal varied from a low of 34,878 tons to a high of 46,503 tons in 1944. Electric energy use increased steadily from 45,000,000 kwh. in 1938 to 174,000,000 kwh. in 1944.

Production totals for 1945 are expected to show a further decline, especially in gold and copper.

The Boliden properties are in the Shellefteaa district of northern Sweden. The orebodies consist of lenses of massive sulphide mineralization occurring over substantial widths in volcanic greenstone corresponding to the Keewatin series of North America (*E.&M.J.*, July 1932). Operations by the present company date back to 1931. Erik Bengston is managing director of the company.

Boliden Metal Production

Year	Gold, Kg.	Silver, Kg.	Copper, Metric Tons	Nickel, Metric Tons	Lead Metric Tons
1938	6,158	20,013	7,147	...	....
1939	6,092	20,488	8,414	...	....
1940	6,500	23,707	10,029	...	....
1941	5,950	23,682	12,117	...	....
1942	5,501	30,663	16,098	3	90
1943	4,201	26,307	16,638	371	154
1944	3,876	31,713	15,858	713	5,281

German Scientists Develop Synthetic Mica Process

Synthetic mica sheets with the equivalent properties and cleavage characteristics of natural mica were produced in laboratory experiments by a group of German scientists during the war. Details of the process, which may be applicable to industrial production of mica blocks six to twelve inches in size, are outlined in a report of investigations by Lieut. Col. Albert E. Link, Chemical Warfare Service, U. S. Army, released through the Department of Commerce.

The Siemens and Halske method, developed during the first World War and patented in 1919, formed the groundwork for research begun in 1941 designed to relieve Germany's shortage of natural mica. Experiments were completed in 1945.

Composition of a mix which would yield the best mica was first determined, resulting in a product of the following analysis:

Constituent.	Percent by weight
SiO_2	35-39
(Al, Fe, Cr, V) $_2O_3$.....	11-12
(Mg, Fe, Mn, Zn) O.....	29-35
$(Na, K)_2 SiF_6$	11-13
(Na, K) F	6- 7

The problem of inducing crystallization of the synthetic mica into large sheets was overcome by introducing a magnetic field of 13 gauss intensity at right angles to the vertical axis of the crucible and by careful control of the cooling of the melt, especially in the critical range of 1,270 deg. to 1,230 deg. C.

Graphite crucibles, with two to three millimeter wall thickness, were used in the experiments and were good for six batches. It is estimated that a one-ton commercial graphite crucible, with wall thickness of 5 to 8 cm., would have a life of ten to fifteen batches. Electricity provided the source of heat, and a reducing atmosphere, in the form of carbon monoxide derived from the coal used in the furnace jacket, gave protection to the graphite crucible.

Cryolite was used as a source of fluorine, which was introduced into the melt by sealing the process crucible in a bath of fluorides.

The best samples obtained in the laboratory from melts of 100 g. to 200 g. contained mica blocks 3½ in. in size. Commercially, blocks of six to twelve inch size are considered feasible. Even larger sheets are a theoretical possibility within the practical limitation of crucible size.